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NEW YORK INDUSTRIAL EXHIBITION.

SPECIAL REPORT

OF

MR. GEORGE WALLIS.

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Presented to Parliament by Command of Her Majesty.
1854.

LONDON:
THOMAS HARRISON, 59, PALL MALL.

MR. GEORGE WALLIS'S

SPECIAL REPORT.

REPORT ON MANUFACTURES.

Class XI. Cotton.
Class XII. Woollen and Worsted.
Class XIII. Silk.
Class XIV. Flax and Hemp.
Class XV. Mixed Fabrics.
Class XVI. Leather (except Tanneries).
Class XVII. Paper, Printing, &c.
Class XVIII. Printed Fabrics.
Class XIX. Carpets, &c.
Class XX. Clothing.
Class XXI. Cutlery and Edge Tools.
Class XXII. Iron and General Hardware
Class XXIII. Works in Gold and Silver Jewellery, and their Imitations.
Class XXIV. Glass.
Class XXV. Ceramic Manufactures.
Class XXVI. Decorative Furniture.
Copyright of Designs.
The position of Art-Education, as applied to Manufactures.

I HAVE now the honour, as one of the Commissioners appointed to visit, during the summer of this year, the Industrial Exhibition at New York, and the various seats of manufacture in the United States of America, to submit my report on those departments of manufacturing industry, the examination of which was confided to me.

Introduction.

In thus reporting upon the growth and present development of those branches of manufactures to which my attention was specially directed, I have thought it advisable rather to treat of them in their broader features, as shown in the localities in which they are carried on, than in their individual manifestations as displayed in the Exhibition at New York. The classification there adopted has, however, been preserved, since it is identical, in all essential points, with that of the Great Exhibition of 1851, to which attention was directed in the instructions given to the Commission.

Avoiding individual criticism as much as the proper illustration of the present position of American industry would permit, I have sought rather to test the results of Transatlantic skill by its own aims, and the peculiar requirements of a people whose wants it is its honourable ambition to supply, than to institute unfair comparisons, which could only lead to conclusions of no practical value. For it could not be reasonably expected that any great amount of originality would be the result of the first efforts of a people, however ingenious, whose experience in many of those branches of manufacture which in Europe have claimed the exclusive attention of skilled artizans for ages, does not date so far back as a single generation.

Manufactures, as a *result*, must, however, be carefully separated from machinery, as a *means;* since, in the latter, originality of conception, construction, and application, is one of the most remarkable features in the progress of industry in the United States; but this Report deals with manufactures only, and originality was not likely to result where imitation of European productions has alone been the aim of the manufacturer and the artizan. The requirements of the markets to be supplied—the competition and comparison of American products with those of England, France, and Germany, and the fact that the very workmen, by whose agency alone a commencement could be made, were Europeans, bringing with them the traditions of the workshops and the conventional types of the old world,—all tend rather to repress than to encourage any departure from the stock forms of the more ordinary and useful productions so constantly in demand, and which the absurd prejudices or vicious cupidity of the mercantile classes often compels the manufacturer not only to imitate, but absolutely to brand with the name of his foreign rival. This is equally unfair to the native as to the foreign producer, since the former is deprived of the credit and reputation due to him for his ingenuity, whilst the latter is deprived of his market, not by fair and honest competition and comparison, but by an imitation of his wares. A difficulty was thus created by those who ought rather to have encouraged, than sought to repress, the rising energies and aspiring ingenuity of their own countrymen; yet such is one of the processes through which American industry has had to pass in many of its branches. Happily this state of things has been much modified recently. Nor should the various disadvantages under which the skilled workman is necessarily

Foreign competition.

Early difficulties in establishing manufactures.

placed be overlooked, since in a new country he becomes almost entirely dependent upon his own resources and ingenuity alone for the supply of those means and materials which, in a more advanced state of manufacturing progress, the division of labour abundantly aids him in procuring. The mutual dependence of one branch of manufacture upon another is so wide-spread and universal that, at first sight, the difficulty in commencing some of them appears so great as to convey the impression that it is insurmountable. Certainly the one thing which, more than any other, strikes the visitor to the seats of industrial skill in the United States, is the ingenuity, the indomitable energy and perseverance displayed in overcoming the early difficulties which must have stood in the way of anything like successful progress at the outset. It is not, therefore, a matter of surprise that many skilled artizans have, from time to time, returned to Europe after an attempt to establish a manufacture, since the embarrassments arising out of almost unaided exertions and an isolated position were too great to allow them to do justice to themselves, or to those employers whose spirit and enterprise might have induced them to embark capital in such undertakings. The pecuniary loss of the latter has frequently been inevitable, and the early history of *nine-tenths* of the various branches of manufacture now flourishing in the United States, and amply repaying their present proprietors, is that of ruin or of enormous sacrifices on the part of those who had the hardihood to become pioneers in those arts which now promise to become, at no distant period, of vital importance to the well-being of millions of industrious men and women. Again, even to the present time, the isolation of manufactories in places at such a distance from each other that mutual aid is almost impossible, renders it imperative that each should be complete within itself, and that everything connected with its operations should be either manufactured on the premises, or kept in stock to such an extent as shall ensure a continuous supply. Thus, both the self-assistance and the laying in a stock of materials are carried to a much greater extent than the majority of English manufacturers would credit. This gives a great peculiarity to the manufacturing system of the States, so far as at present developed, and many of the manufacturers of Birmingham and Sheffield would soon close their doors if they had to furnish themselves with all the partially prepared materials for which they depend upon those whose business it is to manufacture them. Yet such is the position of large numbers of the most successful houses in the United States, and the difficulty is met with a tact and ingenuity of no ordinary kind. There can be no doubt, too, that this necessity for self-supply has been the means of originating many ingenious machines, for which the Americans have so deserved a reputation, as applicable to the manufacture of small articles, or portions of more complicated productions.

Automaton machines.

Thus the very difficulty in procuring human labour, more especially when properly skilled and disciplined, which would assuredly be the greatest drawback to success, appears to have stimulated the invention of the few workers whose energies and skill were engaged in the early development of manufactures; and to this very want of human skill, and the absolute necessity for supplying it, may be attributed the extraordinary ingenuity displayed in many of those labour-saving machines, whose automatic action so completely supplies the place of the more abundant hand labour of older manufacturing countries.

The successful application of mechanical means to one manufacture has been, as a matter of course, stimulative of their application to another, however different; and the adaptative versatility of an educated people was never more fully displayed than in the constant effort to supply their greatest want—that of skilled labour—by applications of mechanical powers to that object. Nor can the most superficial observer fail to be impressed with the advantages thus derived from the long and well-directed attention paid to the education of the whole people by the public school systems of the New England States and of the State of Pennsylvania. Here, where sound and systematic education has been longest and, in all probability, most perfectly carried out, the greatest manufacturing developments are to be found,

Effects of education.

and here it is also where the greatest portion of the skilled workmen of the United States are educated, alike in the simplest elements of knowledge, as in the most skilful application of their ingenuity to the useful arts and the manufacturing industry of their country, and from whence they are spread over the vast territories of the Union, becoming the originators, directors, and, ultimately, the proprietors of establishments which would do no discredit to the manufacturing States of Europe.

American workmen.

As there is no apprenticeship system, properly so called, the more useful the youth engaged in any industrial pursuit becomes to his employer, the more profitable it is for himself. Bringing a mind prepared by thorough school discipline, and educated up to a far higher standard than those of a much superior social grade in society in the Old World, the American working boy developes rapidly into the skilled artizan, and having once mastered one part of his business, he is never content until he has mastered all. Doing *one* mechanical operation well, and only that one, does not satisfy him or his employer. He is ambitious to do something more than a set task, and, therefore, he must learn all. The second part of his trade he is allowed to learn as a reward for becoming master of the first, and so on to the end, if he may be said ever to arrive at *that*. The restless activity of mind and body—the anxiety to improve his own department of industry—the facts constantly before him of ingenious men who have solved economic and mechanical problems to their own profit and elevation, are all stimulative and encouraging; and it may be said that there is not a working-boy of average ability in the New England States, at least, who has not an idea of some mechanical invention or improvement in manufactures, by which in good time he hopes to better his position, or rise to fortune and social distinction.

Sub-division of labour.

At first sight, these characteristics do not appear to be conducive to that orderly, and still less, to that economic working of a manufacturing system, which shall supply the daily increasing wants of a country like the United States. Nor are they so, but for that element of educated intelligence of which they form only one phase. On this intelligent understanding of the true position of things, and the requirements of the social system around him, the skilled workman rests his position. In an old country, with conventional arrangements, in which the minute subdivision of labour grows rather out of the ignorance of the workers than out of their intelligence, since the great mass are only fitted to do one thing well, the great fact of such subdivision must ever be imperatively insisted upon. But it must be remembered that in the United States, the wants and increasing demands of a new country have to be dealt with, not the least of which is, that very skilled labour which the varied occupation of each individual artizan is intended to supply. Nor does this knowledge of two or three departments of one trade, or even the pursuit of several trades by one individual, interfere so much with the systematic division of labour as may be supposed. In most instances the change of employment is only made at convenient periods, or as a relief to the workman from the monotony of always doing one thing. This incessant attention to a single operation is a mechanical process which an uneducated man may prefer, but which, in a majority of cases, the intelligent workman would willingly be spared, if it was not compulsory through the arrangements of the system under which he labours, or if change of employment did not endanger the amount of his earnings. There is, however, one drawback to this otherwise successful violation of the economic law of subdivision. It is unfavourable to that perfect skill of hand, and marvellous accuracy, which is always to be found associated with the constant direction of the attention and practice of the workman to one thing; and this is often very apparent in most of the manufactured articles of America. They lack that perfect finish and completeness of appearance which characterize similar productions of Europe. It is true that the practised eye alone can detect the difference, but it is not the less to be noted on that account. Probably, a more extended experience and thorough practice will do much towards remedying this defect, which may be said to exist in all early efforts either of individuals or of nations.

Social position of the artizan classes.

Hours of labour.

Slave labour against free labour.

The position of the artizan classes of the United States has been the subject of so much disquisition, and it is so generally understood to be satisfactory, alike educationally and socially, that it needs no comment here. It may be requisite, however, in considering the position and development of the different branches of manufactures, to occasionally make reference to the relations in which the producing classes stand—the hours of labour and rate of remuneration, as compared with the same classes in Europe. It will be sufficient, therefore, to state here the general fact, upon which there exists some misapprehension in England, that, though the rate of remuneration is relatively higher, the number of hours constituting a day's work, especially in factory labour, is much greater; and that this excess in the hours of work obtains generally in every industrial occupation. Employment, however, is always plentiful; labour, especially skilled labour, ever in demand. Occasionally, in some of the Middle States, complaints are made of extreme home competition, and that attempts are being made to bring slave labour to bear upon manufactures, to the reduction of prices, and, consequently, of the remuneration of free labour. But, the prevailing idea is, that slave labour can never by any possibility be made to compete or to pay in comparison with free labour. This is held equally by the opponents and advocates of the institution of slavery as it at present exists, and it is only mentioned here in order that it might not be supposed that a question of so much importance in its social, as in its economic aspect, was overlooked; since I have no inducement or inclination to meddle with so fruitful a source of misunderstanding, even in its industrial aspect.

Manufacturing corporations. Laws of partnership.

The laws of partnership of the United States, which encourage the formation of manufacturing companies, with limited responsibility in the non-managing shareholders,* have led to a much greater development of the industrial resources and skill of the country, than, in its circumstances, could have resulted under mere private enterprise for many years to come. It must, however, be evident to every person who carefully examines the joint-stock system of manufactures as it now exists, that it is by no means favourable to the ultimate and permanent success of manufacturing establishments generally, and though there are many highly gratifying and

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* An erroneous impression appears to exist in England as to the extent of the responsibility of all shareholders or partners in the joint-stock manufacturing companies of the United States. The agent or secretary, manager, treasurer, and directors, being also shareholders, are held by the law fully responsible, to the extent of their means, for the results of the management entrusted to and undertaken by them.

The limited responsibility is therefore wisely confined to the non-managing shareholders, the latter being liable only for the amount of their subscription for shares.

Since the publication of the first edition of this Report, Mr. George S. Hillard, of Boston, United States, has kindly called my attention to a slight but obvious error on the subject of manufacturing corporations. As it is desirable that correct information should be obtained on a point now claiming considerable attention in England, viz. the Law of Partnership, it may be desirable to give Mr. Hillard's remarks *in extenso*, as a correction. He says—

"There is no law of partnership of the United States," strictly speaking, except the common law of partnership which we brought from England, and still remains substantially the same in the two countries. The legislative power over partnership belongs to the separate States, thirty-one in number, and the State Legislatures have in various ways modified the rigour of the common-law doctrine. In many of the States especially, the power is given to form limited or special partnerships, in which the general partners are liable to the whole extent of their means, and the limited partners only to the extent of the amount they contribute. Here the general partners manage the business, and the amount contributed by the special partners is advertised and put in record. But our manufacturing corporations are the pure creations of the legislative will. The whole property is divided into shares, which are transferable and assignable at will. In most of the States the private liability of the shareholders (stock-holders we usually term them) is limited by the law to the value of their interest, provided that certain conditions prescribed by the statute are complied with: this is the law in Massachusetts; I think it is the law generally throughout the whole country, so far as manufacturing corporations are concerned; but I am not aware that in these corporations there is any distinction made between the general shareholders and those few who manage the business. All the shareholders are in the same boat."

It will be evident from the latter part of Mr. Hillard's statement, that when in the United States I must have mistaken my informant, himself a manager of one of these concerns in New Hampshire, on the law of partnership in manufacturing corporations, and that the liability is limited throughout, both as regards managing and non-managing shareholders. It is possible, however, that the law in New Hampshire varies from that of Massachusetts; and as this variation of the law in different States is duly noticed in the next paragraph of the text, it is only confirmed by Mr. Hillard's remarks. G. W.

honourable exceptions, those are the best managed where there are the fewest proprietors, and, consequently, the smallest number of individual interests to consult. The machinery of a board of managers, though less cumbrous than in England, is, even in its best form, too slow in its action for the proper care of interests and the execution of prompt and energetic dealings, so essential to success in manufacturing and commercial transactions. And, though the management and responsibility of these concerns is usually narrowed to the limits of safe responsible power, the promptitude of the individual mind of a single proprietor, or even of two or three, who feel that they alone can decide, as they alone are involved in the issue, is wanting.

In stating this, however, it must not be understood as any condemnation of the law of partnership, as it exists in a variety of forms in the different States of the American Union, tending, as it does, to encourage enterprise and skill in combination with limited capital, and affording means of investment of great value to a large portion of the community; but simply as placing the question of management and the organization of industry upon its true basis—that of a distinct interest, combined with full powers and complete responsibility.

As a means of developing the individual powers and natural resources of a new country, encouraging self-reliance, promoting economical habits by affording opportunities for the safe and profitable investment of small amounts of realised capital in the hands of the industrious classes, the value and importance of a limited responsibility in the law of partnership cannot be overlooked or overrated. To it the manufactures of America owe much of their present, as, without doubt, they will of their future prosperity and success.

Character of the Report.

Before proceeding to the consideration of the various classes of manufactures which it is intended to embody in this Report, it is essential most distinctly to explain, that such Report is not intended as a complete exposition of the manufacturing industry of the United States of America. Neither time nor opportunity would permit of such a complete examination of the various localities in which manufactures are carried on; and though the distance travelled over in various States during the comparatively short period of eleven weeks, which my duties in England would permit me to devote to the objects of the Commission, apart from the sea-voyage, was upwards of 5,000 miles, and embraced the States of Massachusetts, Connecticut, New Hampshire, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, the District of Columbia, Eastern Virginia, Kentucky, and Ohio, it must be evident that a full and minute examination of the industry of these States alone would have occupied a much longer period than I could possibly under the circumstances devote to them. The manufactories visited were those which appeared to be most likely to offer a fair type of others which could not be included, or those which I was well assured would present the most complete development of their special branches of trade.

States visited.

Delay in the opening of the Exhibition at New York.

The circumstances of the delay in the opening of the Exhibition at New York were favourable to a more extended visitation of the leading localities than might otherwise have been undertaken. The continued incompleteness, however, of the arrangements of the Exhibition at the time of my departure for England, on the 10th of August last, prevented so complete an examination of the contributions in their respective classes as could have been wished.

In almost every instance, the basis of this Report is the result of careful personal examination and inquiry. In one or two instances, however, where the distance to be travelled over was too great, or the amount of development likely to present itself was not likely to compensate for the time occupied in the journey, I deemed it advisable to communicate by letter with some responsible person; and where the information received in reply was considered of sufficient importance to be embodied in this Report, my authority is given with it.

It is possible that some of the contrivances and processes described may be mere modifications or exact imitations of processes recently introduced into use in England. If so, this must be ascribed to the fact, that no individual could possibly be acquainted with every recent improvement in even one branch of manufacture; and as the work here undertaken involves so wide a range, it would have been an act of great presumption to have decided amongst the many industrial expedients which presented themselves, as to their originality, or their exclusive application in the United States. I have, therefore, preferred mentioning such as were new to myself, but which may be less novel to others, rather than run the risk of neglecting any really useful or ingenious process from a puerile fear of describing something already known to those interested in any special manufacture.

No fact appears more certain than that the manufacturers of the United States take especial care to be well informed on all European improvements, either in machinery or in processes; and as traditional methods have little hold upon the American, as compared with the English artizan, processes holding out the least promise of improvement are quickly tested, and, if found worthy, are adopted either in their integrity or with such modifications as the ingenuity or wants of those applying them may suggest or require.

European artizans employed.

The extent to which European artizans, especially Englishmen, are employed in the manufactories visited, was a point I deemed it worth while to inquire into. The numbers will be found indicated under the heads of the several branches of trade, in connection with the notices of the manufactories in which they are employed.

English workmen.

There are, however, very few Englishmen compared with what I expected to find, or are generally supposed to be engaged in the industrial establishments of the United States. The hours of labour, as already indicated, are too long for most of those who are induced to emigrate, since they usually seek for a less demand upon their energies than they are subjected to in England, as well as a higher rate of payment; and it is no uncommon thing for the really skilled and steady artizan, who can earn a sufficient livelihood at home, to return after a brief trial in the United States. The sudden variations in the temperature, too, and the extremes of heat in summer and cold in winter, are very trying to the majority of English workmen; and if, as is too often the case, they are at all given to intemperate habits, these are aggravated by the climate, and disease and death cuts them off much more rapidly than is, I fear, generally acknowledged. It may not be uninteresting, however, to state, that some of the best and most intelligent artizans, as also some of the most successful manufacturers in the United States, are the sons of Englishmen, taken early in life to their adopted country, acclimated by habit, rendered intelligent by the education received in public schools; their ingenuity and industry stimulated and encouraged by the character of the institutions around them, they often present remarkable instances of self-elevation; and, whilst in an earnest love of their adopted country, they may be said to be more American than the Americans, their secondary pride, if I may use the term, is, that their fathers were Englishmen.

German workmen.

German workmen are largely employed in many departments of industry, and being generally an intelligent and orderly class of men, are highly esteemed. Hence, in some branches of the metal trades, the modes of manufacture are often more German than English, although, perhaps, originally established upon the methods of the latter. Still, taking into consideration the whole number of English, German, and French employed in the United States, I believe it would be found that eight-tenths of the artizan class are Americans, or the children of Europeans, rather than Europeans themselves.

I now proceed to the consideration of the sixteen classes of manufactures which it was my duty to examine and report upon, under their respective heads.

CLASS XI.

COTTON.

Cotton manufactures.

The cotton manufactures of the United States appear to hold the first position in the industrial productions of that country, alike as regards extent and value; and, although their operations are chiefly centralised in New England and Pennsylvania, yet there are only seven of the thirty-one States of the Federal Union in which the spinning or manufacture of cotton is not carried on. These are Louisiana, Texas, Michigan, Illinois, Iowa, Wisconsin, and California. In all the other States, including the District of Columbia, establishments of a more or less important character are to be found By a return printed in a report of the Superintendent of the Census of the United States for 1850, 1054 establishments for the manufacture of cotton goods are stated to be in operation, consuming 641,240 bales of cotton, and manufacturing goods to the value of $61,869,184, or about £12,000,000 sterling per annum. Of these establishments 564 are in the New England States alone; 213 of them being in Massachusetts, 158 in Rhode Island, and 128 in Connecticut: 65 only are to be found in the States of Maine, Vermont, and New Hampshire; but the 44 mills returned as being in the last-named State manufacture nearly as much in quantity and value as the 286 establishments of the two States of Rhode Island and Connecticut. Of the 530 mills scattered over the remaining eighteen States, Pennsylvania has 208. Of the Southern States, Georgia and Tennessee have the largest number of establishments, those in the former being returned as 35, and in the latter 33; but, from information received in Virginia, there is no doubt the number of mills in Georgia has increased considerably since 1850.

Number of persons employed in cotton manufactures.

The number of persons employed in the cotton manufactures of the whole of the States was 33,150 males, and 59,136 females.

The New England establishments are conducted upon a similar principle to the largest cotton factories of Great Britain, and spinning and manufacturing are carried on as one concern. This, however, is not the characteristic of the mills in the above States, as they are, in many instances, employed in spinning only; and in Pennsylvania, Georgia, and Tennessee, yarns are produced chiefly for the purposes of domestic manufacture by hand, which still obtains in many parts of the older States of the Union. Thus, whilst in Pennsylvania the capital invested amounts but to about one-seventh of that of Massachusetts, the quantity of cotton consumed is one-fifth, the value of raw material not quite one-fourth, the number of operatives (male and female) one-fourth, the value rather more than one-fourth, the number of pounds of yarn spun and sold as yarn is above *thirty* times greater in Pennsylvania than in Massachusetts. This, to a certain extent, gives a key to the difference in the modes of manufacture in the two States, and illustrates the distinction already alluded to. There can be no doubt, however, that domestic weaving is gradually giving way, and those manufacturers, especially in Pennsylvania, who formerly did a prosperous business as spinners only, now find that the Eastern States supply the piece goods at a rate so little above the cost of the yarn, that it is not worth the while of the farmer to continue this primitive custom of weaving his own cloth. Thus the domestic loom is fast following the spinning-wheel of the early settlers, and those manufacturers who until recently have spun yarn only, are gradually introducing the power-loom as the only means of sustaining their position in the market. This was illustrated by a visit to the "Eagle Cotton Mill," Pittsburg, Pennsylvania. Formerly the proprietors spun yarn alone, and did a successful trade; but, by a return with which they favoured me, I find that in six establishments under their direction they had introduced already 540 looms to the 26,000 spindles, and were manufacturing sheetings at the rate of 6,000,000 yards per annum, together with twilled cotton bags, batting, and yarns, from 5*s.* to 18*s.*; and this, in order to make the latter pay by consuming the surplus yarns themselves. In the Penn Cotton Mill, Pittsburg, the more modern system had become the rule of the establishment, and with 7,000 spindles and 207 looms, 2,730,000 yards of shirtings were produced annually, besides 240,000 lbs. weight of coloured yarns for carpet warps and cotton rope.

Cotton mills, Pittsburg, Pennslyvania.

At two establishments at Richmond, Virginia, the consumption of the yarn in the manufacture of piece goods, was also the rule; and this being the extent of my journey southward, it became a matter of interest to inquire as to the progress of the cotton manufacture in the cotton-growing States. Georgia, Tennessee, and

Cotton mills, Richmond, Virginia.

North Carolina were quoted as those in which the greatest progress had been made; whilst Virginia, South Carolina, and Alabama, were the next. In Tennessee spinning would appear to be the rule, and manufacturing the exception. In Georgia and North Carolina equal attention is paid to both; whilst in Virginia, South Carolina, and Alabama the manufacture of piece goods is decidedly more extensively carried on than spinning only. Slave labour is said to be largely used, with free whites as overseers and instructors.

Cotton manufacture in the Southern States.

Slave labour in cotton mills.

In the two establishments above named free white labour alone is employed. The males are heads of departments, machinists, dressers, &c., and the females are spinners and weavers. The latter are chiefly adults, though children from twelve to fifteen are employed. The average hours of work here are twelve, but vary a little with the season; *very full time* being the rule,—at least such is the statement of the manager of the James' River Company's Mill. This establishment, as also the Manchester Cotton Company's Mill, is at Manchester, Chesterfield county, Virginia, and situated opposite to Richmond, on the James river, from the falls on which the water power used for driving the machinery is derived. The James River Mill produces a large weight of work for the extent of its machinery. The goods manufactured are coarse cottons, and average about 2½ yards to the pound; shirtings, 28 inches wide (Osnaburgs), summer pantaloons for slaves, and bagging for export to the Brazils for sugar-bags, running about 3 yards to the pound. Bagging of a lighter character, for grain, and 36 inch Osnaburgs, two yards to the pound, are also produced. The Manchester Company manufacture sheetings, shirtings, and yarns, and employ about 325 operatives, the children being of the same average age as at the James River Mill. The manager, Mr. Whitehead, is an Englishman, as is also the chief mechanic. The former has just perfected a patent "speeder," of which the latter expressed a very high opinion. Its advantages are a greater speed, a more even roving, and a bobbin of any desirable size, which never becomes spongy in the winding.

James River Mill, Richmond, Virginia.

Manchester Company, Richmond, Virginia.

Patent "speeder."

The small development of the cotton manufacture in the States of Indiana, Mississippi, and Arkansas, or even those of Ohio and Kentucky, required no special inquiry.

Cotton manufactures in Maryland.

In Maryland, however, there were twenty-four establishments in 1850, chiefly engaged in manufacturing piece goods, such as drillings, sheetings, ducks, Osnaburgs, and bagging. The yarns produced for domestic purposes bear but a small proportion to those manufactured into cloth, and these are chiefly sold within the State for the home weaving of mixed fabrics of wool and cotton, forming coarse linseys. The wool is mostly spun by hand in the farm-houses, and the fabrics when made are entirely for domestic use. In Maryland, too, bleaching is carried on to a considerable extent.

Cotton manufactures of the New England States.

Having thus endeavoured to illustrate the position of the cotton manufacture in the form in which it has developed itself in the South, and, so far as circumstances would permit of an inquiry, in the Middle States bordering on the west; the manufacturing system, as manifested in the cotton trade of New England, demands consideration. If the illustrations given show the early progress and position of this manufacture in the United States, so far as daily recurring improvements and ever increasing wants have permitted it to remain in its original form, the manufacturing towns of Lowell, Manchester, and Lawrence strikingly demonstrate the results of the energy and enterprise of the manufacturers of New England.

At Lowell, Massachusetts, the cotton manufacture has been developed in a form which has been a theme for many writers on the economy and social bearings of the factory system; and the plans so successfully put into operation here, and carried on since 1822, have led to the erection of large establishments, with their attendant boarding-houses, at Manchester, New Hampshire, and more recently at Lawrence, Massachusetts; whilst a commencement has been made at Holyoke, in the same State, by the Hadley Falls Company, which promises a result of a more extraordinary character than anything yet achieved in the United States. Each of these localities present features peculiar to themselves, and, besides the manufacture of cotton goods, other branches of production in textile fabrics are carried on.

Origin of Lowell, Massachusetts.

The falls of the Pawtucket, on the Merrimack river, and the Pawtucket Canal, which had previously been used only for the purposes of navigation, and connecting the river above and below the falls by means of locks, presented to the original projectors of Lowell a site for the solution of an important problem, not only in American industry, but to a great extent in that of Europe itself. This was the combination of great natural advantages with a large and well-directed capital, resulting in extensive and systematic operations for the realization of a legitimate profit; whilst the social position of the operative classes was sedulously cared for, and their moral and intellectual elevation promoted and secured. The example has not been lost, even in Europe, and the possibilities of the manufacturing system of a country being carried on without deterioration, but, on the contrary, to the consolidation and promotion of the best interests of the labouring classes, having been so unmistakeably proved, many improvements in the larger manufactories of England, not only of those engaged in manufacture of cotton, but in other branches of industry, have resulted from the enlightened and profitable system commenced barely thirty years ago by the founders of Lowell, which is now a city containing nearly 35,000 inhabitants.

Statistics of the Lowell corporations.

In that place there are eight manufacturing corporations, exclusively employed in the manufacture of cotton goods, two of which print and dye their own fabrics, and one company (Lowell Manufacturing Company) which manufactures cotton Osnaburgs in addition to its staple production of carpets. There are thirty-five mills, besides the print works above named, belonging to these companies. (See Table, Appendix No. 1.) These produce 2,139,000 yards of piece goods per week, consisting chiefly of sheetings, shirtings, drillings, and printing cloths, varying in quality from No. 13 to No. 40. The greater portion, however, are No. 14s and No. 13s. The consumption of cotton is 745,000 lbs. per week, spun and manufactured upon 320,732 spindles and 9,954 looms. The average per spindle is 1¼ yard per day, the medium produce of a loom being, in 14's 45 yards, and 30's 33 yards per day.

The number of operatives employed in the cotton manufacture by the eight corporations exclusively engaged therein is 6,920 females and 2,338 males. This, however, does not include those employed by the Lowell Manufacturing Company in their cotton mills, as the returns only show the gross number of hands engaged in the cotton, carpet, and other departments of that establishment. The average wages of females, clear of board, is $2, or about 8*s.* 4*d.* sterling, per week, whilst the wages of males show an average of $4 80 cents, or about £1 sterling, per week. The average hours of labour per day, *exclusive of meals*, is 12, the mills commencing at 5 a.m. and closing at 7 p.m.

Wages at Lowell.

Hours of labour at Lowell.

Character of cotton goods.

Of the quality of the goods produced, it will be sufficient to say, that they are generally excellent of their class, and quite equal, sometimes superior, to similar fabrics manufactured in Britain. Those of Lowell may be taken as fair examples of other cotton mills in the United States, possessing the same advantages as regards power, improved machinery, and intelligent operatives. In spinning, it will be seen that the numbers are low, the finer quality of cotton goods not being produced; the No. 40s "printers" manufactured by the Merrimack Company being the highest class. These, when printed, are of a firm and excellent fabric. The Lowell Manufacturing Company produce a very cheap and well-looking fabric for cotton trowserings at 17½ cents, or about 9½*d.* sterling, per yard. These are made up of dyed yarns in checks and stripes, and are woven on gingham looms.

Cotton trouserings.

In selecting the cotton manufactories of Lowell as an illustration of other manufacturing localities engaged in the same branch of industry, it must be borne in mind that each of the latter have certain features peculiarly their own; but as the statistics of Lowell, as given (see Table-Appendix, No. 1), fairly represent the rate of production, &c., in the class of goods included therein, in the best and most extended form as to economy, organisation, &c., in a group of establishments, no useful purpose can be served in quoting the relative rate of production of single manufacturing companies in groups of two or three. It will be sufficient, therefore, in glancing at the cotton mills of Lawrence, Manchester, and Holyoke, to quote the total productions from returns courteously furnished by their respective agents or managers.

Mills at Lawrence, Massachusetts.

As the manufacturing establishments of Lawrence are intended by their enlightened proprietors to comprise all the advantages derived from the experience gained at Lowell, I would beg to quote the following description of the Atlantic Cotton Mills,* from the Appendix to the Sanatory Report presented to the Legislature of the State of Massachusetts in 1850:—

Atlantic cotton mills, Lawrence, Massachusetts.

"The Atlantic Cotton Mills have erected a building 600 feet in length, five and six stories in height, partly 64 and partly 106 feet in width, which is devoted to the manufacture of brown cotton goods. It is designed to contain 42,500 spindles and 1,168 looms: 25,088 spindles and 728 looms are now in operation; and 164 male and 619 female operatives are employed. This number will be increased to about 1,200 when in full operation. The motive power is supplied by three of Boyden's improved iron turbine wheels, each 8 feet in diameter, and of 300-horse power; 12 mill-powers are devoted to these mills. The boarding-houses belonging to these mills consist of six blocks, containing 68 tenements, and are built upon a similar plan, and have the same admirable arrangements for water, cleansing, sewerage, and other purposes, as those belonging to the Bay State Mills, noticed in the description of that establishment (Class XII; see Appendix, No. 3). 32 of these tenements are intended for the females; and 36, equally good, but containing fewer rooms, are intended for the overseers in the mills, and for men with families, who may also take boarders."

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* An admirable library has been established in connection with the Atlantic Mills by the overseers and operatives. The agent, Mr. H. K. Oliver, having given 100 volumes as a foundation, and loaned $50 for the purchase of books. Subsequently, the sum of $50 and 24 volumes was presented by the treasurer, Mr. William Gray, and further donations from the late Mr. Amos Lawrence and the Lawrence Tract Society. The library now contains 1,100 volumes; and, on an analysis of the printed catalogue, of 986 of these I find that the selection of books is admirable. There are, on History, 125 volumes; Biography, 98; Religious; 60; Fiction, 187; Poetry, 56; Travels, 78; Philosophy, 16; Science, 20; Mechanics, 10; Agriculture, 10; Natural History, 7; Miscellaneous, 319.

The permanent members, who are chiefly the overseers, pay $1 per annum; those who simply become members to use the books, pay 60 cents (about 2*s.* 7*d.* sterling) per annum; these are chiefly mill hands; and about one-third of the operatives thus subscribe to the library. It must be remembered, however, that about *one-third* of the female operatives in this mill are Irish, who either cannot read or write, or have no taste for reading. One of the hands, a young man, acts as librarian, for which he receives a small remuneration from the library fund. The books are given out and returned every Saturday evening, half an hour after bell-time; the requisite rooms for the safe keeping of the books being found by the proprietors of the mill, rent free.—G. W.

Weekly production of the Atlantic cotton mills, Lawrence, Massachusetts.

By a return for the week ending 30th July, 1853, 7,783 pieces of goods were manufactured, containing 299,262 yards, and weighing 99,647 lbs. These consist of plain sheetings, shirtings, and drillings No. 14's, and plain sheetings and shirtings No. 24's, varying in average yards to the lb. from 1·47 in drillings to 5·40 in shirtings. Examples are exhibited by the Company's agent at the Exhibition of New York.

Manchester, New Hampshire.

Lawrence, like Lowell, derives its water power from a remarkable fall in the Merrimack river, across which a dam, 1,011 feet in length, has been constructed. Manchester, New Hampshire, is also situated on the same river.

The Amoskeag Fall at this latter place has a fall of about 52 feet in one mile, and is formed into two dams, the head-waters of which feed canals on two levels, from which the power is used. The first or highest level has a fall of about 20 feet,—the second one of 30 feet. The power is estimated at 10,000 horses, of which less than 5,000 are at present in use; about 750 only being in the lower level or second canal. The natural construction of the fall was very favourable to an economic use of the power,—the upper dam being raised only 5 feet high; the engineering works of the dams and canals were consequently inexpensive in comparison to those of South Hadley, on the Connecticut, to be hereafter mentioned, or even the dam at Lawrence. Turbine wheels of large size are used, as at the latter place.

Amoskeag Company, and Stark Mills, Manchester, New Hampshire.

There are two cotton manufacturing companies at Manchester,—the Amoskeag Company, and the Stark Mills. The former consist of four mills, the latter of two, and it is scarcely possible to conceive anything more complete than these manufacturing establishments, with the requisite boarding-houses conveniently situated for the purposes of the operatives.* The goods produced in the Amoskeag Mills are of excellent quality, and consist of ducks, tickings, denims, drillings, sheetings, and cotton flannels of varied width and quality. The ducks and tickings are excellent fabrics, of which examples were exhibited in the Great Exhibition of 1851, and obtained a prize medal. The total productions of the Amoskeag Mills for the four weeks ending 21st May, 1853, was 1,597,166 yards, weighing 585,745 lbs.; and the amount paid in wages was,—males, $6,604 83 cents; females, $21,143 66 cents; being a total of $27,748 49 cents, or at the rate of upwards of £5,500 sterling per month.

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* As an illustration of the relations existing between the operatives and the corporations who employ them, it may not be uninteresting to state that on the day I visited Manchester by invitation of several of the directors, the annual meetings of the Manchester Print Works Company, and the Amoskeag Manufacturing Company, were held. The operatives employed by the latter having reason to fear that in the erection of another mill, a favourite elm, one of the last of the old forest trees on the banks of the Merrimack, would have to be cut down, hastily got up a petition, which was signed by upwards of 500 of the mill hands, male and female, and presented it to the meeting of the proprietors, requesting that, if possible, the tree should not be cut down; and giving many reasons alike creditable to the good sense and feelings of the petitioners, amongst which were, "that it was a beautiful and goodly tree," and belonged to a time when "the yell of the red man and the scream of the eagle were alone heard on the banks of the Merrimack, instead of the two gigantic edifices filled with the buzz of busy and well-remunerated industry,"—"a connecting link between the present and the past, and perhaps may serve as an ever-living yet silent monitor, each autumn, as the aged and yellow leaf falls from among its fellows, to remind us of our own mortality." "It is, it may be therefore assumed, a *useful* tree, to say nothing of its absorbing noxious gases, and giving out healthy ones." The petitioners repudiated any intention to interfere with the arrangements of the shareholders in the disposal of their property, acknowledging how largely they were indebted to them for "the green enclosures and hundreds of trees which line the streets, all promptly cared for and protected at no inconsiderable expense; and though they could not but indulge a hope that the company would 'spare that tree,' yet," say the petitioners, "we shall not murmur if, upon the whole, by stern necessity, you should remove the object of our solicitude." The company, however, decided to comply with the wishes of the operatives so properly expressed, and, as I had every reason to believe, from the position of the tree, at no little inconvenience and cost. On examining the signatures to the petition, I was struck with the admirable character of the handwriting of the majority.

There is a savings bank attached to the Amoskeag mills, in which has been deposited $137,000 (about £27,000 sterling) since 1840, on which 5 per cent. per annum is paid by the company. This does not include amounts withdrawn by operatives leaving the establishment. And it may be well to state here, that the average continuation of females devoting their attention for a time to factory-labour, is about 2½ years at Manchester and about 3 to 3½ at Lowell. At Lowell, each corporation formerly had its own savings bank for its own operatives, allowing, as in the case of the Amoskeag Company, an interest on deposits. Now, however, they are all consolidated into one general savings bank, and the deposits amount to $700,000 (about £140,000 sterling).—G. W.

Monthly production of the Amoskeag mills, Manchester, New Hampshire.

Specimens of the goods manufactured are exhibited at the Exhibition of New York.

As Mr. Whitworth's engagements did not permit him to visit Manchester, it may be proper to state here that the Amoskeag Company have extensive machine shops for the manufacture of locomotive engines, and the machinery for their mills. The average number of locomotives turned out this year will be five per month.

Stark Mills Company, Manchester, New Hampshire.

The Stark Mills Company manufacture 36 and 48 inch sheetings, and 30-inch shirtings, No. 14 yarn, and 48-inch drills, No. 12½ yarn, ducks, and seamless grain-bags, and an article, a species of drilling, known as leather cloth, which is now coming into extensive use as a substitute for morocco (see Class XVI). The seamless grain-bags constitute a novel and important article of trade, and are of excellent quality and make. These bags are 45 inches long, and are manufactured of various qualities and weight. The warp is a double one, and, by the construction of the loom, the "filling," or weft, traverses both sides, uniting the warps at the edge, instead of producing a selvage. The loom is a perfect self-actor or automaton, so to speak; it commences the bag, goes on until the requisite number of picks has been thrown in to make up the length; it then closes the bottom, throws in a given number of picks as a *tab*, and then commences another bag. All that the weaver has to do is to attend, in the usual way, to the perfect working of the machine, and cut out each bag when completed, as from their thickness any quantity accumulated on a cloth beam would be an incumbrance to the machine. As the bags are cut out, each weaver folds and piles them by the side of each loom, and

Seamless grain-bags.

Power-loom for seamless grain-bags.

these are removed and an account taken every half-day. The bags are hemmed round the top, or mouth, by sewing machines, each machine being attended by one female operative, and the average work of each is 650 bags per machine per day.

There are 126 of these seamless bag looms at work in the Stark Mills. The average make is 47 bags per loom per day, and the speed about 130 picks per minute. This is rather high, as the general speed of power-looms, and indeed of machinery generally, is lower than in England. By this means human labour is economised, and one operative can attend to more machines. Thus, it is often found that a weaver will attend to four looms in the United States, who, in the same quality of work, would attend to only two in England. I believe, however, that the conviction is gradually forcing itself upon the mind of the British manufacturer, that machinery may be run at a speed which is not economical, either as regards the quality of goods produced, or the most profitable use of human labour.

Speed of machinery.

The seamless bag loom is the invention of Mr. Cyrus W. Baldwin, of the Stark Mills, and the looms are all manufactured in the machine shops of that establishment.

Pillow-cases and bed-bolsters could be as easily and as profitably produced by this loom as grain-bags, but the latter are in great demand at present. Mr. Baldwin has just patented an adaptation of his invention to the weaving of cotton hose for fire-engines. The experimental loom will produce 1,000 feet of hose per day, and from the perfect character of the work, there is no material escape of the fluid when the hose is filled with water, as the fabric swells, and it is as perfect as a duct as the ordinary leathern hose, and much more elastic and portable. In point of economy, too, the cotton hose must possess great advantages, its cost being but 6½ cents, or about 3½*d.* sterling, per foot, and no oiling is required to preserve its elasticity. This alone gives it a greater advantage over the leathern hose, since both labour and material are saved; the cost of the latter being 62½ cents, or about 2*s.* 9*d.* sterling, per foot, and requires renewing every three years.

Cotton hose for fire-engines

Thus, if the cotton hose was renewed every year, which it is not likely would be requisite except under very peculiar circumstances, an immense saving would be effected. But a double hose, which would wear longer than the leather, and still save the oiling, can be made by inserting a smaller cotton hose within a larger one; a coating of caoutchouc rendering the whole perfectly water-tight, and less susceptible of external injury than a single hose would be. It is scarcely possible to conceive a more perfect fabric than the hose produced by the experimental loom shown to myself by the inventor, who states that it is also applicable, and that he is about to adapt it, to fancy weaving. The invention is patented in England, as well as in the United States.

Improved carding-engine.

An improvement in the carding engine is in operation here. It consists of a series of circular saws with very fine teeth, set round a cylinder. It throws out an immense quantity of dirt which escapes the ordinary carding machines. Should flax cotton ever come into general use, this would be the most fitting machine for carding it clean, and getting rid of the woody fibre, by a mechanical instead of a chemical process, the initiatory steps towards which will be mentioned in its proper place in Class XIV.

Monthly production of the Stark mills, Manchester, New Hampshire.

The total production of the Stark Mills for the month ending May 28th, 1853, was in drills, sheetings, &c., 1,046,138 yards, weighing 379,132 lbs.; in seamless bags 109,544 yards, weighing 97,895 lbs. The number of operatives employed, 1,054 females and 215 males. Specimens of the bags are shown in the Exhibition at New York, but not by the company.

Nashua, New Hampshire.

At Nashua, in New Hampshire, also on the Merrimack river, there is a considerable development of the cotton manufacture, but Manchester presents the highest type in that State. Manufactures of various kinds, chiefly cotton and woollen, may be said to be carried on at almost every available point on the Merrimack and Charles rivers, and indeed upon the smaller and more tributary streams of New Hampshire and Massachusetts. The largest river passing through the latter State, however, has only recently commanded sufficient attention to induce the employment of a sufficiently large capital in developing its immense natural advantages; and it would certainly appear that at Holyoke, on the Connecticut river, the factory system of the United States of America is destined to the fullest expansion under the most favourable circumstances as regards power, the conveyance of raw materials and manufactured goods, as also salubrity of situation for a manufacturing town.

Hadley Falls Company, Holyoke, Massachusetts.

The Hadley Falls Company have here constructed a dam across the Connecticut river, 30 feet high at the head-water, and 1,017 feet long; whilst taking advantage of the peculiar conformation of the land on the banks, the application of the power derived therefrom is so arranged, that a row of mills two miles in length might be erected, and power to drive at least 1,000,000 spindles easily applied thereto. A town is laid out in a plan calculated to secure many advantages to its future inhabitants, and boarding-houses, &c., erected for the operatives employed in the two mills and machine shops already at work. Another mill, intended for the manufacture of fancy fabrics, is now in the course of erection. Of the two above named, one contains 18,432 spindles for No. 14 yarn, which is manufactured into sheetings at the rate of about 5 tons weight per day. The other mill contains 30,700 spindles for No. 90 yarn, this being the finest number spun in the United States. It is manufactured into lawns, or jaconetts, chiefly for printing. There are 450 looms in this lawn mill. The goods thrown off are of a superior quality, and show that the manufacture of the finer fabrics in cotton is as likely to be successfully carried on in the future, as the coarser and more useful qualities have been in the past. There is only one other mill for the manufacture of lawns in the States. This is at the Portsmouth Steam Mills, Portsmouth, New Hampshire. Here there are 26,000 spindles driven by steam power, the yarn being No. 90's, as at Holyoke. Another mill for this class of goods, the Pacific Mills, Lawrence, Massachusetts, is in the course of erection, and will be in operation shortly.

Lawns for printing.

Portsmouth steam mills, Portsmouth New Hampshire.

As already indicated, there are a considerable number of mills manufacturing cotton goods, many of these, too, of large size, in detached localities in the New

England States; but those visited, and now reported upon, may be considered as types of the whole.

Cotton manufactures, Manayunk, near Philadelphia.

In Pennsylvania, as already mentioned, the establishments are generally smaller, and are more isolated. There is a considerable concentration of the cotton manufacture at Manayunk, on the Schuylkill river, near to Philadelphia; but though promised the particulars as to production, class of goods, &c., it has not been furnished to me.

The manufacture of ginghams is now carried on to a large extent, particularly at South Hadley, opposite to Holyoke, and at Clinton, Massachusetts. The goods are admirable, though light in quality; of good dye, and the colours generally put in with good taste.

This, however, depends so much upon the market or class of customers for which the goods are intended, that justice to the manufacturer always demands caution in pronouncing as to the fitness or non-fitness of decoration, even in its simplest forms.

It will therefore be sufficient to say here, that the combinations of colour are often harmonious and pleasing, and sometimes even elegant, and in a material which is regularly sold at 12½ cents to 15 cents, or from 6½*d.* to 8*d.* sterling, per yard retail, and therefore within the reach of all classes.

Glasgow mills, South Hadley, Massachusetts.

Ginghams.

The Glasgow Mills, South Hadley, derive the water power which drives their machinery from the head-water of the dam constructed by the Hadley Falls Company for the works at Holyoke; indeed the privilege is rented from that corporation. They are entirely devoted to the manufacture of ginghams. The yarns, 28s and 30s, are spun on 10,000 spindles, and manufactured into cloth by 300 power-looms carrying 4 shuttles each, for different-coloured yarns, and acting by means of a revolving shuttle-box. Each loom produces from 28 to 30 yards per day, and the total produce of the establishment is 14,000 pieces, of 30 yards each, per week, giving a total of 52,000 yards. The yarns are all dyed on the premises, and are generally clear and brilliant in colour, and the goods have a reputation for fast dyes.

The Glasgow Mills Company contribute to the Exhibition at New York a very satisfactory assortment of dress ginghams, handkerchiefs, gala plaids, and white and coloured cotton yarns.

Lancaster mills, Clinton, Massachusetts.

The Lancaster Mills Company, Clinton, Massachusetts, manufacture ginghams on an extensive scale. The looms, 600 in number, together with 96 carding engines, are all in one room or loom-shed of excellent construction, lofty and well ventilated, the roof being of slate and glass, supported on iron columns.

There are 21,000 spindles and 800 operatives, chiefly females. The yarns are No. 25 warp, and No. 27 filling or weft. The goods, therefore, are of a little lower quality than those of the Glasgow Mills, which, as already stated, are manufactured of No. 28 and No. 30. The make and dye, as also the general selection of colours, in the Lancaster Mills, are good, and the goods must be largely in demand, as the make averages 5,000,000 yards per annum, or 100,000 yards per week.

Cotton bed quilts. Lancaster Quilt Company, Clinton, Massachusetts.

The manufacture of cotton bed-quilts by a method included in Bigelow's patent for the manufacture of Brussels carpet by the power-loom, is also carried on at Clinton by the Lancaster Quilt Company. The mill is small, and was erected for other purposes. These bed-quilts are good, cheap, and useful articles, in great demand. There is considerable scope for design, untrammelled by the conditions of Marseilles or quilted fabrics, from the facility with which the figured surface can be produced. The fabric, however, does not present the substance of the ordinary quiltings, but in other respects is admirably adapted for summer use, or for hot climates.

Tickings.

Tickings are extensively manufactured, and often form a department in the large cotton establishments in the New England States. The manufacture of them, with checks, stripes, &c., also form a considerable item in the home industry of Pennsylvania, and, to a certain extent, in the factory system of that State. Some goods of this class, contributed at the New York Exhibition, manufactured by D. Lammot and Son, Lenna Mills, Delaware county, Pennsylvania, are most excellent of their kind. They are 36 inches wide, 1,100 reed, No. 30 warp, and No. 35 filling or weft, with 140 picks to the inch. It is scarcely possible to conceive a firmer or

Lenna mills, Delaware county, Pennsylvania.

better made article, and the traditionary notion that really good tickings can only be manufactured from flax receives a severe shock when such cotton goods as these are presented for examination. The Lenna Mill runs 4,000 spindles, and works 160 looms, of which latter twenty-nine are for the manufacture of the finer qualities of ticking quoted above. It is comparatively a small establishment, situated in one of those beautiful valleys, on a stream supplying water power, with which the State of Pennsylvania abounds, and which, in presenting great natural facilities, have originated the comparatively large number of small manufacturing establishments, especially of cotton and woollen yarns and goods, to be found in that State.

The manufacture of stocking-net and of cotton hosiery of the coarser qualities is gradually developing itself in various localities, especially in the States of Connecticut and Massachusetts. As, however, hosiery comes under the head of Class XX (Clothing, &c.), this branch of industry will be noticed in its proper place.

Contributions of cotton goods to the New York Exhibition.

The display of cotton goods in the Exhibition at New York, as illustrative of this branch of industry, is, on the whole, a satisfactory one; nearly every special department having one or more representatives.

It is now requisite, in order to complete as far as possible this review of the cotton manufactures of the United States, to briefly notice such branches as may not have come within the range of business of the establishments visited and reported upon, and whose contributions to the Exhibition have been indicated in due course.

The generality of contributions of cotton fabrics most generally in demand, such as sheetings, shirtings, drills, ducks, &c., are of good make and quality, and are often well finished and neatly made up. These, however, need no special remarks, and a reference to the catalogue for the names of the contributors will be sufficient.

Silesias.

The silesias manufactured by the Franklin Manufacturing Company, Providence, Rhode Island, as also the same kind of goods, together with nankeens and drills of a fine quality, manufactured by Goddard Brothers, of the same place, are excellent fabrics, well dyed and finished.

Canada plaids.

The Canada plaids, adapted for vestings, manufactured at Whittenton Mills, Taunton, Massachusetts, are excellent in make and dye, and in good taste in the selection of the colouring. In cotton damasks and quilts, dyed and plain, the goods of Malcolm and Heskett, Paterson, New Jersey, are the only examples of American production of their kind. They are of fair make, and the usual character in design.

Cotton damasks and quilts.

The cheapness of cotton in the United States, as a raw material, causes it to be used for many of the purposes for which flax and hemp are alone employed in Europe. The cotton sailcloth shown at the Great Exhibition of 1851 was an evidence of this. Therefore cotton is largely used in the manufacture of cordage and twine, and the examples shown in the Exhibition at New York are very excellent. The American Cordage Company, New York city, exhibit specimens of patent cordage, rope-rigging, tow-lines, &c., of various sizes. These are remarkably clear in the strand, and are evidently made with great care. Cotton seine-twine, and cotton lines for drift and other nets, are also exhibited, which show how largely cotton is employed in this branch of trade.

Cotton cordage and twine.

Fishing nets of cotton-twine are woven by Mr. John McMullen, of Baltimore, on a loom of his own invention. These are not exhibited, but they are quite equal in every respect, probably superior, to hand-made nets.*

Cotton fishing-nets.

Cotton-wick for candles and lamps forms another item of the cotton trade in the United States, lamp-wicks being largely consumed. Mr. A. Wortendyke, Godwinville, near Paterson, New Jersey, exhibits specimens of cotton-wick, counter-twist wick for patent machine mould candles, and chandler's wick. These are excellent examples of their kind.

Candle and lamp-wicks.

The estimate formed of the present position of the cotton manufacture of the United States must be one of no merely apologetic character. All that has been attempted has been well done, not only in the results,

Estimate of the position of the cotton manufacture.

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* See Mr. Whitworth's Report on this invention.

but as regards the methods by which these results are attained; and if, as will undoubtedly strike the European observer, many of those developments of the cotton trade in its finer and more ornamental fabrics are as yet unattempted, it must be remembered that the useful fabrics, those absolutely necessary to the comfort of the great mass of the people, were those which would be first in demand, and most likely to remunerate the enterprise of the earlier manufacturers.

Calico purchased at Boston in 1813.

In the New York Exhibition a specimen of British calico is exhibited, which was purchased by the contributor, Mr. Hagerson, at Boston, in 1813. Its width is 33½ inches, its price at that date 85 cents, about 3*s*. 8*d*. sterling, per yard. The same quality of cloth can now be purchased for 3½ cents, about 2*d*. sterling, per yard. An illustration like this proves how largely manufacturing skill, not only in Europe, but in America, must have progressed since that period; diffusing health and comfort, independence and happiness, by affording occupation to hundreds of thousands in both continents; whilst its influence has been felt in the social relations of life in a remarkable degree in the United States, as evidenced by the condition of the people in Lowell, Manchester, Lawrence, and other places of less concentration, but not of less skill, enterprise, and industry, or of lower tone as regards morals or social position.

Communication from Georgia on the growth and preparation of cotton.

Since my return to England, I have received through his Excellency John F. Crampton, Her Majesty's Minister at Washington, two communications from Mr. Henry Le Weeks, Hannahatchei, Stewart county, Georgia, making inquiry as to certain conditions in the growth and preparation of cotton, for the information of the planters of the Southern States. The questions asked appeared so important that, being desirous to obtain and transmit the best practical information, I communicated with Thomas Bazley, Esq., President of the Manchester Chamber of Commerce, and Henry Houldsworth, Esq., also of Manchester; and subsequently, at the suggestion of Mr. Bazley, with Robert Hyde Greg, Esq., Norcliff, near Macclesfield. Each of these gentlemen furnished me with replies to the questions transmitted, which I embodied in a reply to the communications of Mr. Le Weeks.

A copy of that reply, and of the communications to which it is an answer, will be found appended. (See Appendix, No. 2.)

CLASS XII.

WOOLLEN AND WORSTED.

Woollen manufactures.

Next to cotton manufactures in extent and value, but scarcely less in importance, are the various branches of the manufacture of woollen and worsted goods now carried on in the United States. Many of these are of comparatively recent introduction, whilst others have been pursued for years under many disadvantages, both as regards the supply of raw material, and the skilled labour requisite to carry out the more perfect finish of the better class of goods. In many respects these difficulties have been in a great measure overcome, and the higher class of woollen goods produced in America will, in many respects, compare with similar fabrics manufactured in Europe. But it is more than questionable whether, as is frequently asserted, the wool of which these goods are manufactured is of American growth, unless in some special instances, or where the material has been carefully selected for the purpose. For though American wool is particularly well adapted to casimeres and stuffs, from the length of its staple, it is not so well suited to the manufacture of broad cloths. This opinion is borne out by that of the most experienced buyers of this class of goods. There can be little doubt, however, that the position to which the manufacture of the higher quality of cloths has attained will stimulate the growth of the finer qualities of short staple wool. And when the success of the examples shown by the American growers at the Great Exhibition of 1851 is remembered, it must be quite evident that an accurate knowledge of the requirements of the woollen manufacture in its two great divisions, the one demanding a "carding," and the other a "combing" staple for their perfection in fabrics, is alone needed to enable the growers of the United States to meet all the

American wool.

requirements of the home demand, at least. At present German, English, and Australian wools are imported for the manufacture of certain classes of goods; but, according to the report in the census of 1850, the largest proportion of imported wool comes from Buenos Ayres and the neighbouring States on the Rio de la Plata. This is of a coarse and cheap variety, costing from 6 cents to 8 cents, about 3¼*d.* to 4¼*d.* sterling, per pound. The same authority states that the imported wool amounted up to that date to about one-third of the whole raw material manufactured; but that whilst in 1850 the quantity of wool imported into the United States was 18,669,794 lbs., valued at $1,681,991 (about £336,500 sterling), a remarkable increase took place in the year 1850-51, far exceeding the importations of any previous year, being 32,548,693 lbs., and to the value of $3,800,000 (about £760,000 sterling). This would go to prove a great and sudden increase in the woollen manufactures, and this is borne out by the fact that many of the larger establishments were either commenced or largely increased their make about this period, particularly in the coarser quality of carpets and the manufacture of felted goods.

Statistics of the woollen manufactures.

By the census returns of 1850, twenty-four of the thirty-one States of the Union, and the District of Columbia, had establishments engaged in some department of the woollen manufacture. The seven States in which this branch of industry had not been commenced were, South Carolina, Florida, Alabama, Missisipi, Louisiana, Arkansas, and California. The New England States had not so many establishments in operation as the two States of Pennsylvania and Virginia, and only five more than those of New York and Ohio. Thus it will be seen that, whilst the cotton manufacture is located more exclusively in the Eastern States, the woollen manufacture is extended in almost equal proportions over the whole of the Middle States, and extends itself into the western regions and towards the south. The extent of the woollen manufactures of Massachusetts, however, is seen in the fact, that whilst in the 380 mills of Pennsylvania the consumption of wool is 7,560,379 lbs., employing 3,490 males and 2,236 females, producing 10,099,234 yards of cloth and 1,941,621 lbs. of yarn, of the annual value of $5,321,866 (about £1,064,000 sterling); 119 establishments in the first-named State consumed 22,229,952 lbs. of wool, employ 6,167 males and 4,963 females, and produce 25,865,658 yards of cloth and 749,550 lbs. of yarn, of the annual value of $12,770,565 (about £2,550,000 sterling). The difference of the modes of manufacture in the two States above-named, as illustrated by the cotton trade, is here shown again in the fact, that a very large proportion of the produce of the woollen mills of Pennsylvania is yarn only, a large amount of this being consumed in home manufacture for domestic use, or in the weaving of mixed goods and carpets by hand, and this, too, in addition to the home-spun woollen yarns mentioned as being worked up with the cotton yarns produced for that purpose. The 130 establishments in Ohio, as also 121 in Virginia, 25 in Kentucky, and 33 in Indiana, would appear to manufacture the greater portion of the yarns spun therein; it is probable, therefore, that the yarns of Pennsylvania are largely used for the supply of the West in the materials for home weaving. After all, however, this department of industry is becoming daily more and more exceptional; but it is interesting as illustrating the early condition of a new country in its efforts to supply its own wants, in the absence of that larger development of manufacturing means and appliances which capital, skill, and a large and ever-increasing demand can alone establish on a firm and enduring basis.

Woollen yarns.

The total number of persons employed in the various establishments for the manufacture of woollen goods in the United States in 1850 was 22,678 males and 16,574 females; 82,206,652 yards of fabric were produced; and the total value of the production was $43,207,555, or about £8,650,000 sterling.

Wages, as in the cotton trade, vary very much in different localities, but the average appears to be slightly lower than in that department of industry in the New England States, whilst it is higher in Pennsylvania. In the Western States the increased average is considerable.

Many of the establishments of New England being very extensive, are conducted upon a similar plan to the larger cotton mills. At Lowell, the Middlesex Company's mills present a good type of this higher class. The number of operatives employed is, males 575, females 730. The mills run 16,340 spindles, with 75 looms for broadcloths, and 328 looms for cassimeres. The weekly production is 24,000 yards of cassimeres, and 3,000 yards of broadcloths. Cheap broadcloths are produced here, with a cotton warp, presenting a very good surface. These sell at $1½ (about 6*s.* 6*d.* sterling) per yard. Doeskins are the chief make, and, with beaver cloths and cassimeres, are manufactured entirely of native wool. The printed trouserings manufactured by this company are, in common with similar goods produced by others, of a very effective character. The colours are clear, and generally well selected, and the style and finish much better than would be generally supposed by those whose ideas of fancy cassimeres are set upon woven patterns only. They appear also to suit a large class of buyers, particularly for the western markets, as being at once low in price and showy in character; and the colours are said to wear better than European opinions of such modes of production would give them credit for. The general make of goods by the Middlesex Company is illustrated in the Exhibition at New York.

Middlesex mills, Lowell, Massachusetts.

Broadcloths.

Cassimeres

Doeskins.

Beaver cloths.

Fancy-printed cassimeres.

The Bay State Mills, Lawrence, Massachusetts, may be said to offer the best type of a large woollen establishment manufacturing a great variety of fabrics. These mills form a model establishment, so to speak, of its class; alike as regards extent, construction, machinery, arrangement and internal economy. It has been therefore thought advisable to extract an illustrated description of it from the Report of the Sanitary Commission of Massachusetts, 1850, given in the Appendix. (See Appendix, No. 3.)

Bay State mills, Lawrence, Massachusetts.

There are 1,000 males and 1,200 females employed at present in the Bay State Mills, working 98 sets (3 to a set) of carding engines, and 700 looms, together with the dye works and printing shops for flannels and carpets. In the week ending 7th May last, the production of this establishment amounted to 40,898 yards plain

Monthly production of the Bay State mills.

flannels, 3,962 yards twilled flannels, 10,159 yards fancy cassimeres, 6,770 yards satinettes, 1,030 yards broadcloths, 568 yards beaver-cloths, 1,703 yards felted carpets, 2,752 yards felted beavers, 1,540 yards felted linings, 1,464 long shawls, all wool, and 5,970 square shawls.

Dyed and printed flannels.

The flannels are all either dyed in fancy colours or printed. The latter is chiefly blockwork, although cylinders are used for some styles. These fancy-coloured flannels are extensively used in the United States for children's clothing, and make up into elegant-looking, yet low-priced, articles of dress. The cassimeres are of good make, and the pantaloon satinettes (cotton warp) are excellent of their kind in colour and finish.

Pantaloon satinettes.

Felted cloths.

The felted fabrics manufactured are noticeable as being produced by a different method to that adopted by any other establishment.* These are excellent goods, both as regards the firmness and, to a certain extent, elasticity of their texture; and the imitation "petershams" are superior to even the general run of common cloths for overcoats. In England there still exists, and perhaps not without cause, a strong prejudice against all felted fabrics for apparel. It would appear, however, that they are largely used in the United States in making up cheap clothing. There are some peculiarities of the people, however, as affecting consumption, which will be considered in due course.

Felted lining-cloth.

The felted lining cloth, composed of gauze and a comparitively small quantity of wool, is a new and useful fabric. The wool is felted down upon the gauze as a back, and the substance obtained by this means is much greater than the quantity of material employed would warrant any one to expect. When the back or gauze surface is concealed by the use of the fabric as a lining, the result, as regards appearance, is very satisfactory, and it is said to wear well, as the two materials are fairly united by the felting process.

Woollen shawls.

The manufacture of woollen shawls was first commenced in the United States at this establishment, and is the only one in which they are yet manufactured, to any extent, at least. They consist of gala plaids, manufactured chiefly of American wools. The general styles are well selected, and the dyes and finish well managed. The fringing machine is a useful and ingenious contrivance, by which the threads constituting the fringe of each shawl are twisted to a proper tension. It does the work usually performed by hand, and accomplishes as much as 10 females.

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* See Mr. Whitworth's Report.

Fringing machine for shawls.

Printed shawls.

The printed shawls produced at the Bay State Mills are of the usual character as regards fabric; the patterns being chiefly oriental in style. They are all printed, dyed, and finished before they leave the establishment.

There is an excellent display of the shawls manufactured by the Bay State Mills in the Exhibition at New York.

The printed felted carpets or druggets made here will be duly noticed in their proper class (XIX).

Manhan Manufacturing Company, Waterbury, Connecticut.

On visiting the Manhan Manufacturing Company's Works, Waterbury, Connecticut, I found the more general felting process at work for the production of felted cloths of good character, chiefly for overcoats. An excellent imitation of "petersham" is also made here, the curled surface being well wrought and finished. Felted carpet fabrics are also manufactured, but not printed, in this establishment. At Clinton, Massachusetts, the Clinton Company, in addition to the manufacture of coach lace, to be hereafter noticed, employ 100 looms in making pantaloon stuffs, being mixtures of cotton and wool. The looms are similar to the gingham looms mentioned in Class XI, and the fabric produced is a well-looking and cheap article, for which there is a large sale.

Clinton Company, Clinton, Massachusetts.

Pantaloon stuffs.

Woollen manufactures of Maryland.

In Maryland there is a considerable development of the woollen manufacture; and, in this State, the highest as well as the lowest class of goods manufactured may be said to be produced. Baltimore is the centre of this trade, and a coarse quality of fulled linseys, six quarters wide, form a species of domestic manufacture of the district 50 miles round that city. These linseys are chiefly manufactured for negro clothing, and are sold to the planters at the South for the use of their slaves. Considerable quantities, too, are sold in the West, as far as the Missouri and the Rocky Mountains, being

Fulled linseys.

used there for the clothing of labourers and backwoodsmen.

Garment plaids. State Penitentiary of Maryland.

In the State Penitentiary of Maryland, at Baltimore, coarse garment plaids, of good make, are woven by hand by the prisoners. The cotton and woollen yarns are also spun and dyed by them. The colours are generally clear and brilliant, being selected with more discrimination, as regards taste, than is generally found in the coarser class of goods either in America or in Europe. The fabric is an useful one, and is in such demand in the Southern and Western States, that manufacturers are induced to get up imitations in competition with the article as produced in the Penitentiary.

The produce of the Penitentiary looms is about 500 pieces per week. The return promised by the Warden, of the number of looms, carding engines, and spindles, together with the number of persons employed in this department, has not, however, reached me.*

Wethered and Brothers, Baltimore.

At the establishment of Messrs. Wethered and Brothers, Baltimore, the manufacture of the higher qualities of doeskins and fancy cassimeres is very suc-

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* The profitable employment of prisoners is a rule in all the State penitentiaries of the United States.

The labour is farmed out to a contractor, who finds the proper tools, machinery, and materials of labour. In the Maryland Penitentiary, in addition to the spinning and dyeing of yarns, and weaving the fabrics named, rag carpets are woven in looms adapted to the purpose, the weft, or filling, being composed of white and coloured rags twisted or spun into a strong cord or yarn. There are also extensive workshops, in which wooden pails and buckets are made, chiefly by machinery directed by the prisoners, and the manufacture of corn brooms, so largely used for domestic purposes in the United States, is also extensively carried on. A large nail forge, chiefly for the manufacture of railway pins by a mechanical contrivance, is another branch of industry pursued by the prisoners; and the dressing of bristles, for the use of brush-makers, is about to be added to the employments already followed.

The prison authorities have nothing to do with the direction of the labour, that being in the hands of the respective contractors. They enforce the discipline of the prison, and obedience to the direction of those employed by the contractors to superintend the work.

The earnings, or returns to the State, of even the lowest class of prisoners in the Maryland Penitentiary is 62 cents. (about 2*s.* 8*d.* sterling) per day. Each prisoner is tasked to earn a certain amount, according to his employment or presumed capacity. All above the amount is carried to his account, and paid to him when he leaves the prison, or he is permitted to purchase such books as the Warden

Woollen goods in the Exhibition at New York.

cessfully carried on, and the examples contributed by them to the Exhibition at New York are a most satisfactory proof that, for all practical purposes, the American cloths are equal in quality and finish to similar goods produced in Europe. This is confirmed by the cassimeres, doeskins, and satinettes manufactured by Jacob T. Seagreave and Company, Burrellsville, Rhode Island; Platner and Smith, Lee, Massachusetts; Slater and Sons, and the Vassalboro' Manufacturing Company, Maine, exhibited at New York by their respective agents. The latter company exhibit three-quarter cassimeres, made of Silician wool (4,000 warp), of an exquisite texture and beauty of finish. In fact, the contributions to this department of the Exhibition at New York, though not very numerous or extensive, go to prove very distinctly that, in the production of the finer qualities of woollen goods, great advances have been made in the United States. The efforts after novelty, however, do not always lead to successful results in European eyes, and the fancy trouserings are often extremely *outré* in pattern.

Fancy cassimeres with Jacquard woven patterns.

The Jacquard has been lately introduced into use in the production of figure patterns in fancy cassimeres. There are good specimens of these manufactured by the Melville Manufacturing Company, Melville, Massachusetts. The pattern being woven, the goods are slightly fulled afterwards, and the result is satisfactory when too defined a figure has not been attempted. In small patterns the fulling process breaks down the forms, and thus gives, when finished, an agreeable variety to the surface.

Satinettes.

The satinettes manufactured by the Perkins Company, Akron, Ohio, speak well for the progress of the woollen trade in the west.

The perfection of dying and finish to which felted fabrics have been brought is well illustrated by the goods

approves of. This is the mode in which many prisoners for life prefer expending their surplus earnings, and many of them have excellent collections of books.

In the New York State Penitentiary at Sing-Sing, cutlery of a very superior quality is said to be manufactured; but time did not permit of an inspection of the industrial operations in that prison. G.W.

manufactured by the Union Manufacturing Company, and Lonnsburg, Bissell, and Company, Connecticut, and the Winipank Mills, in the same State. It is scarcely possible to believe that so simple a process as that of laying sheets of wool in succession, and, by mere vibration, working them together, could produce such fabrics as the best kind of American felted cloths certainly are.

Blankets. Flannels.

The blankets and flannels exhibited at New York are fairly illustrative of the excellence which the manufacture of this class of goods has obtained in various parts of the United States.

CLASS XIII.

SILK.

Silk manufactures.

The manufacture of silks is comparatively exceptional in the United States, and notwithstanding many vigorous attempts, not only to establish the manufacture, but to raise the raw material on an extensive scale, little has resulted except in the production of sewing and fringe silks and twist.

Growth raw silk.

The growth of silk in any considerable quantity never appears to have been fairly realised, although in the State of Connecticut, where the greatest number of establishments are still carried on for the manufacture of sewing silks, it rose from 2,430 lbs. weight in 1827 to 176,210 lbs. in 1844, being an approach to one-half of the whole amount produced in the United States in that year, viz., 396,790 lbs. The decrease since that date to 1850 has been so great, that it is quite evident comparatively little is now doing in the culture of silk, since only 10,843 lbs. is given as the production of the latter year.

Taking a deep interest in this department of industry, and the probable value of silk as a collateral crop to the farmer in a country in which there appeared no difficulty whatever in the raising of the silkworm, I prosecuted my inquiries as far as time would permit, hoping to be enabled to reconcile the very contradictory opinions abroad on this question. It is acknowledged on all hands that many portions of the United States are well adapted to the growth of the mulberry tree, and the healthy development of the silkworm; but it was also quite as evident that the active habits of the people were not adapted to the work of looking after the cocooneries, or managing filatures for reeling the silk. This work, however, was attempted to be carried out in large establishments during the period intervening between 1831 and 1845. The "*Morus Multicaulis*" speculations arising out of the mania for mulberry-trees, and the failure of the cultivation of raw silk on a scale not at all suited to the peculiarities of its growth and culture, produced a reaction in the public mind in the latter year; and since that period the growth of silk has been comparatively neglected, even where it might be successfully carried on in the manner usual in France and Italy, if the habits of the agricultural classes were not, more or less, opposed to a somewhat sedentary occupation, requiring, for a certain period of the year, incessant attention. It was this which doubtlessly suggested large establishments for the care of the silkworm; but when disease attacked any portion, the whole perished. It was found, too, that the "morus multicaulis" was comparatively worthless, and that the native and best varieties of the white or Italian mulberry produced the only silk really worth growing.

States best adapted to the growth of silk.

The States of Virginia, Ohio, Kentucky, and Tennessee are generally acknowledged to be admirably adapted for the growth of silk, and excellent examples of the produce of each State have been, from time to time, brought forward; and there can be little doubt that, under a proper system of domestic culture, with suitable centres for receiving the cocoons and reeling the silk, an excellent material would be the result.

Former growth of silk at Economy, Pennsylvania.

At Rapp's Colony, or "Community of Economy," on the Ohio river, Pennsylvania, the annual produce of cocoons was formerly 3,000 lbs. weight, which was reeled and partly manufactured on the spot. Mr. R. L. Baker, the present director of this establishment, now states, however, that the growth of silk has been abandoned, having ceased to be at all profitable.

At Wheeling, Virginia, Mr. J. W. Gill still continues to collect cocoons and reeled silk from the States above named, and this is manufactured, with the addition of foreign silk, into a variety of goods, but not to any extent.

Silk manufacture near Cincinnati, Ohio.

American silk is also manufactured on a small scale, and, with the addition of the imported material, at Newport, Kentucky, on the opposite side of the Ohio to Cincinnati. Here are five or six looms, and a little throwing and winding machinery, the property of Messrs. Jones and Wilson. The manufacture is carried on by the latter, an English weaver from Macclesfield. Specimens of the goods produced are displayed in the Exhibition at New York, and consist chiefly of neck-ties, vestings, and dress fabrics of very fair quality and finish, and excellent grey goods for printing. Mr. Wilson, a practical weaver understanding his business, and desirous to improve it, is thoroughly impressed with the capabilities of the district around for the perfect growth of silk equal to the best Italian, but confesses that he sees little prospect of the culture being so managed as to be of much importance for many years to come. Native reeled silk costs $5 to $5 50c. per pound. Imported silk can, however, be purchased for much less, notwithstanding a duty of 15 per cent. Thus this latter fiscal restriction is of no practical value, but, on the contrary, adds to the difficulty of the manufacturer, the 25 per cent. duty on manufactured goods giving him little or no advantage; for the 7 per cent. waste, which he cannot work up in the United States, has to be sent to England at a great loss, and no drawback is allowed on the raw material thus exported by the original importer.

Cost of native silk.

Duty on imported silk.

Sewing silks, New England.

There are several manufactories of sewing silks at Mansfield, Connecticut, and a few other parts of New England. In 1845 there were four mills in Norfolk county, Massachusetts, consuming 12,900 lbs. of silk per annum; in Hampshire county three mills, consuming 6,100 lbs.; and in Middlesex county one mill, consuming 3,505 lbs. Probably the largest establishment of the kind in the United States is that of Mr. John Ryle, Paterson, New Jersey. Sewing silks, floss silks, and silks for fringes and gimps, constitute the production of this mill, which is a well-conducted and compact

Paterson, New Jersey.

concern, near the Passaic Fall, on the river of that name. The consumption of material is from 1,000 lbs to 1,200 lbs. weight of silk per week. The articles manufactured are excellent of their kind.

Philadelphia.

At Philadelphia a branch of a firm at Macclesfield, Cheshire, is carried on for the manufacture also of sewing silks. Mr. B. Hooley, the proprietor, tried the production of ribbons, but did not succeed in making them at such a price as would command a market.

Ribbons, Philadelphia.

Silk braids. Silk fringes.

Ribbons, however, are manufactured by Messrs. Horstmann and Sons, of Philadelphia, but rather as a means of keeping their extensive establishment for the manufacture of silk braiding and fringes in full work, at periods when the latter are not in sufficient demand. The braiding machines are therefore so constructed that, by the substitution of the jacquard, ribbons can be woven upon them. This concern will be alluded to under another head (Class XX).

West Newton, Massachusetts. Silk braid.

At West Newton, Massachusetts, Messrs. Plymton, Stevenson and Company, of Boston, have a small establishment for the manufacture of silk braid and ribbons. The braids are generally tasteful in design and well made; the ribbons, however, are deficient in surface, and show a want of experience in the weavers. Here, also, the jacquard machine is applied to the braid-looms when required for ribbons. There are not more than twenty of these.

Power-loom brocatelles.

Eagle mills, Seymour, Connecticut.

Power-looms for weaving brocatelles.

The most important enterprise in the silk trade now prosecuting in the United States is that of the application of the power-loom to the weaving of brocatelles at the Eagle Mills, Seymour, Connecticut. This establishment has only recently commenced work. The machinery is beautifully constructed, and works with great accuracy. The looms carry revolving shuttle-boxes, and are all made upon the premises. Ten looms are in full work, five preparing, and ten more in the course of construction. The goods manufactured are 48 inches in width, of firm fabric, but defective in the surface. This arises more from the evident inexperience of the weavers, than any defect in the mode of production. These weavers are females, selected from carpet manufactories, and, of course, lack the practised eye of the silk weaver in detecting defects. Cotton is chiefly thrown in for the backs, though linen is sometimes used. The designs are French in character, and superior to those generally produced in such fabrics. The price varies from $3 to $3½—that is to say, from 12*s.* to 18*s.* sterling per yard; but it must be taken into account that the width is twice that of similar goods as generally manufactured in England.

Card-cutting machine.

A very excellent adaptation and improvement upon the French and English "reading off" and card-cutting keyboard machine is used in this establishment, the invention of the superintendent.

This would appear to be the first attempt to fairly introduce the manufacture of the higher class of silk goods into the United States; and there is every probability that it will be a successful one, from the admirable character of the arrangements and accuracy of the machinery, when directed by increased experience.

Silk goods in the Exhibition at New York.

The goods intended for exhibition by this company had not been arranged at the Exhibition at New York at the period of my departure, and the display in this class was very scanty.

Examples of upholstery silk damasks, brocades, and silks for ecclesiastical decorations, the production of European weavers, manufactured by the exhibitor, Mr. Jacob Neustader, of New York, presented some points of excellence, and a few examples of sewing-silk were illustrative of this branch of the silk trade.

From these remarks it will be readily understood that this department of industry is comparatively in its infancy, and that, in the growth and preparation of the raw material, the United States have receded, and not advanced, since 1844.

CLASS XIV.

FLAX AND HEMP.

Manufactures in flax and hemp.

The extensive use of cotton for many of those fabrics which in Europe are manufactured of flax, and even of hemp, such as sailcloth, sacking, twine, and cord, has evidently not been favourable to the employment of the latter as materials. The manufactures of flax seem, at present, to be altogether exceptional, whilst hemp is employed to a considerable extent in most of the large cities of the United States, in the production of ropes and cables, tarred and untarred; and of these, together with a few specimens of sailcloth and hemp carpeting, there are some creditable examples in the New York Exhibition. The growth of hemp in the United States, as shown by the census of 1850, is returned at 35,093 tons, but there is some doubt as to the accuracy of the return, and no means of comparison with former statements, as the gross produce of flax and hemp were given together in 1840. Manilla and Sisall hemps are imported, but the hemps of the States of Missouri and Virginia are largely used. Formerly New Jersey exported a considerable quantity of hemp.

Growth of hemp.

Cables.

The cables produced in the navy-yards of the several cities, where such establishments are kept up by the Government, are of a very high character.

New flax machine.

In the manufacture of flax, improvements in the preparation of the fibre appear to engage more attention than any other point. A machine has been recently invented which seems likely to produce some satisfactory results as regards the preparation of flax-cotton by mechanical rather than a chemical operation.

Growth of flax.

Flax is largely grown in some of the States for the seed, for oil making, and the straw is at present thrown away. In some parts of Pennsylvania and Ohio, it can be bought for from $4 to $5 (about 17*s.* to 22*s.* sterling) per ton, delivered to the consumer, and can often be obtained for the mere cost of carting away, after the separation of the seed. Flax-seed is raised at from 15 to 20 bushels per acre, usually 16 to 18 bushels. This sells at $1 per bushel, and, if more cultivated, the price would perhaps be reduced to 40 cents.

Flax cotton.

In the mechanical process above named, the straw is put through a machine and crushed by rollers. By an arrangement for a difference of speed in these rollers, the fibre is torn to pieces and reduced to a cotton wool, the woody fibre falling out in the process.

The flax, thus prepared, can be sold without further preparation to paper-makers at 2 cents (about $1\frac{1}{4}$*d.* sterling) per pound. A chemical process is applied simply to bleach, after the separation. This statement as to the growth and price of flax, and the results of the mechanical operation of the machine, is given on the authority of Mr. Kennedy, of the firm of Messrs. Kennedy, Childs, and Company, Penn Cotton Mill, Pittsburg, Pennsylvania. The samples of unbleached flax-cotton, prepared by this process, appeared, on examination, to be of sufficient length of fibre for spinning on the ordinary cotton machinery, and only to require finally freeing from the smaller particles of woody substance. For this purpose, the new carding-machine, in operation at the Stark Mills, Manchester, New Hampshire, alluded to in Class XI, seemed most especially well adapted from the thorough manner in which it clears the material submitted to its action.

Flax carding.

CLASS XV.

MIXED FABRICS.

Mixed fabrics.

The mixed fabrics manufactured in America have been treated of in Class XII, alike for convenience as from the fact that they chiefly belong to that class of manufacture, though composed of other materials as well as wool.

The only fabrics calling for notice here are mousselline de laine and barrage, which are manufactured by a few firms in New England, the most extensive being the Manchester Print Works Company, Manchester, New Hampshire, and the Hamilton Woollen Company, Southbridge, Massachusetts. The produce of the Manchester Company's mill, for the week ending June 4th, 1853, was 422,389 plain de laines, 7·44 yards to the pound. The printing and dyeing of these goods will be considered in due course in Class XVIII.

Grey mousselines de laine.

The grey mousselines de laine manufactured by the companies above named are firm fabrics, of a fair class, and are woven by power. The Manchester Company employ 400 looms in the manufacture of varied qualities of de laine and barrage cloths; the coarser kinds of the former being woven of No. 37 cotton warp, and No. 40 wool weft or filling. In the finer qualities, No. 70 cotton warp, spun on the Potter mule, and No. 50 wool weft, spun on the Smith mule, are used.

Silk and wool flannels. Printed shawls.

The contributions in this class to the Exhibition at New York are very limited. The specimens of silk and wool flannels are good, and the fabric of the printed shawls of the usual character; the patterns of the latter being of the oriental style.

CLASS XVI.

LEATHER (EXCLUSIVE OF TANNERIES), FURS, &C.

Manufactures in leather.

The manufacture of leather in its various forms and qualities, and its making up into articles of use, has grown into an important branch of the industry of the United States. Differing in no important point with the methods used, or the purposes to which it is applied in Europe, the manufacture of leather into saddlery, harness, portmanteaus, &c., is carried on in almost every town of any importance, and the trade is conducted on a similar principle to that usually adopted in England. Occasionally large manufactories of portmanteaus and harness are met with; but these are exceptional. At Philadelphia the manufacture of articles in leather is followed to a very considerable extent, and the harness and saddlery produced in this city is of a very superior character, alike as regards workmanship and beauty in design. Nor are the productions of New York and Boston less noticeable for the same qualities.

Harness and saddlery.

Portmanteaus.

In portmanteaus, valises, and other articles for use in travelling, considerable ingenuity in arrangement is often shown. The workmanship and finish of the best class of goods are unexceptionable, and, even in the cheaper and lower qualities, the style in appearance is a matter of much consideration, and displays a decided advance, in point of taste, upon the unsightly character of the cheaper kind of travelling conveniences in England.

Manufactures in leather in the Exhibition at New York.

There are very few examples of portmanteaus contributed to the Exhibition at New York. In harness and saddlery, however, there are specimens showing great skill in execution, as also fitness and beauty in construction and decoration. The whips are generally of excellent workmanship, but the mountings are often in the absurb taste which at present prevails in Europe.

Whips.

In furs and feathers, those shown, though of American production, are more or less of European manufacture, and in artificial hair there are some clever contrivances.

Furs and feathers.

Artificial hair.

Specimens of furs from the State of Minnesota are also exhibited. These chiefly consist of marten, otter, fisher, mink, and beaver, together with buffalo-robes and bear-skins, and are generally well preserved and of fine surface. Minnesota is the great fur-producing State of the Union, and the trade of 1852 is said to have reached nearly $700,000 (about £140,000 sterling).

Furs from the State of Minnesota.

The specimens of various kinds of leather contributed to the Exhibition at New York, show in a most favourable light the ability of the Americans as tanners and finishers of leather, in nearly all its most useful forms. As Professor Wilson reports on tanneries, it is requisite only to remark, that in fancy-varnished leathers, and in morocco, the surface, finish, and elasticity are generally of a high character.

In connection with the material of morocco leather, it may be as well to notice here an important invention already alluded to in Class XI., under the name of leather cloth. This is a most perfect imitation of morocco, by the application of a preparation of caoutchouc, or gutta percha, to the surface of plain woven or twilled cotton cloth. The surface is corrugated in imitation of morocco, and is coloured and varnished so as to present all the external appearance of that kind of leather. The elasticity is perfect, showing no tendency to crack, and so far as time has at present tested its durability, this appears to be satisfactory. Its cost is less than one-third that of morocco, and from the width of the cloth, it cuts to much greater advantage in the covering of articles of furniture, for which, as well as carriage linings, particularly railway carriages, it is coming largely into use. Time did not permit of a visit to the manufactory of the patentees, Messrs. J. R. and C. P. Crockett, at Newark, New Jersey, but specimens

Morocco cloth.

of the fabric have come to hand recently, which fully confirm the opinions above given; but it is now stated, that after a trial it has not been found to answer for the lining-band of hats, to which it was at first applied, as the colouring matter is decomposed by wear, from the surface not possessing the absorbent quality of leather.

As the trade in raw hides and the manufacture of leather must, from the extent of the latter, form a most important item in the productions of the United States, it is to be regretted that, up to the present time, the census returns for 1850, in this department of industry, have not been made public.

CLASS XVII.

PAPER, PRINTING, TYPES, BOOKBINDING, &c.

Paper manufacture.

The manufacture of paper is carried on to a great extent in most of the Atlantic States, but unfortunately the census returns, so far as published in a collective form, do not contain the statistics of this important branch of trade, which must have increased to a great extent within the last few years, as the quantity of printing papers alone consumed in the United States must be immense.

The whole production is by machinery, not more than one or two houses making hand-made papers. The machines are all adaptations and improved applications of Fourdinier's invention, modified to suit the wants or ideas of the manufacturer, who would appear to be the stationer also, as far as the making up of the paper into reams, quires, and packets is concerned, and its distribution to the retail trader, even in the ornamental form in which it reaches the public. In this respect the general commercial dealings in paper are very different to those of England, and the function of the wholesale stationer is an exceptional one in the United States.

Paper mills in the State of Massachusetts.

The State of Massachusetts would appear to be largely engaged in the manufacture of paper. At Lee, Berkshire county, in that State, there are 19 paper mills, employing a capital of about $200,000 (about £40,000 sterling). In Norfolk county, Massachusetts, there are 17 mills, and in Worcester county, 15 mills, employing a capital of £100,000 sterling in this manufacture. In 1845, up to which date the last general statistical information on the State of Massachusetts is published, there were 89 paper mills, consuming 12,886 tons of materials, and making 4,765 tons, giving 607,175 reams of paper per annum, the value of which was $1,750,373 (about £370,000 sterling), and employing 1,369 operatives; and this certainly gives no exaggerated view of the general position of the paper trade in nearly all the New England States, New York, New Jersey, and Pennsylvania, at the present date.

Materials used in the manufacture of paper.

The materials used are chiefly raw cotton and mill waste. Linen rags are imported from Europe, but the principal consumption would appear to be cotton, either as above named or in rags. The general character of the printing paper is of a low quality, with a very small amount of dressing or size. In writing-papers the make is quite equal to the general run of European papers, but the finish is not always so perfect. It is stated, however, that whilst the Americans try to imitate the English finish, the latter are trying to imitate that of makers of the United States.

Wall papers for hangings.

A considerable number of paper mills are engaged in the manufacture of wall-papers only, for printing as hangings. These vary in quality, but are chiefly of the coarser and cheaper kinds; and as there is a constantly increasing demand in this branch of the paper trade, the manufacture extends rapidly.

Ivanhoe mills, Paterson, New Jersey.

The Ivanhoe Mills, Paterson, New Jersey, have the reputation of being the most complete establishment of its kind in the States. This manufactory is erected on the Canal, by which the head water of the Passaic Fall, on the Passaic river, is converted into mill power.

The buildings are admirably arranged, and whilst every department, from that for the reception and picking of the rags and cotton waste, to the making up of the paper, is complete within itself, the whole is so connected as to be perfectly progressive; thus economising labour, and preserving the orderly arrangement and cleanliness of the whole establishment.

Book papers.

Book-papers only are manufactured, and two sets of operatives are employed, one for night and the other for day; so that the works always go on, except on the Sabbath.

There are ten vats or engines for grinding the materials for making the paper. These are larger than those generally used in England, and this appears to be the rule throughout the United States. Each vat contains pulp sufficient for making 180 lbs. weight of paper. In England they usually contain 120 lbs. only. The bleaching of the material is effected in a number of air-tight chambers of large size, built of stone, with iron doors, the whole so constructed that no chlorine can escape.

Paper machine, Ivanhoe mills.

The paper machine at work in the Ivanhoe Mills is one of great accuracy and beauty, wood framing being avoided as much as possible in the construction, and bright brass substituted. The whole has a clean and elegant appearance, with perfect freedom from rust; whilst the action is firm, smooth, and steady.

Carew paper-mill, South Hadley, Massachusetts.

Writing papers.

If the inspection of this establishment was satisfactory as to the mechanical and economic arrangements, and the excellence of the book-papers produced, a visit to the Carew Manufacturing Company's Paper Mill, South Hadley Falls, on the Connecticut river, Massachusetts, showed that the older mills were quite equal to the production of the first qualities of writing-papers, though the internal arrangements might be less consecutive and complete than those of the Ivanhoe Mills. The Carew Company's papers are firm, well-finished examples of the best class of writing-papers, pure in colour, and well glazed. The pressing is chiefly effected with steam-heated cylinders covered with paper, through which the sheets pass in quick succession, and a very good surface is obtained.

Roller pressing.

Contrivance for cutting the sheets.

The cutting of the paper into sheets is effected by a very simple but ingenious contrivance. A knife is set in the wheel round which the paper revolves as it leaves the machine; a flat board, swinging on a pivot, comes in contact with the edge of the knife at stated intervals, thus measuring off the sheet and cutting it at the same operation. The sheets fall into a receptacle below the revolving cutter, and are removed at stated intervals as they accumulate.

The water used in the Carew Mill is not from the Connecticut river, from which the power is obtained, but from an artesian well sunk in the rock on which the mill is built. The water is of great purity, and the supply is most abundant.

It has been already stated that the paper manufactures of the United States fulfil the functions of the wholesale stationers of England. Of this the Carew Company are an example. In the above mill the paper is made, cut into sheets, pressed, the edges cut and gilt, ruled by machinery when required, and made up into reams, quires, and packets, in such covers as the retail stationer to whom it is supplied may require; the styles of making up being more or less imitative of those adopted in Europe.

Wrapping papers.

The wrapping papers of the United States are of great variety, both as regards quality and colour.

Envelopes.

Envelopes are usually made of a light buff-coloured paper; but the chief portion of the fancy stationery at present used would appear to be imported from Europe.

Book printing.

The printing operations are extensive and well conducted, particularly in book-work. The printing of newspapers alone forms a large item in the industry of the country. In the New England States, according to the Abstract of the Census of 1850, there were 424 newspapers; in the Middle States, 876; in the Southern States, 716; and in the Western States, 784; and the following table shows the daily, weekly, and monthly issues and aggregate circulation, as given by the above authority:—

Number of Newspapers published in the United States in 1850.

	Number.	Circulation.[1]	Number of copies printed annually.
Dailies	350	750,000	235,000,000
Tri-weeklies . . .	150	75,000	11,700,000
Semi-weeklies . .	125	80,000	8,320,000
Weeklies	2,000	2,875,000	149.500,000
Semi-monthlies . .	50	300,000	7,200,000
Monthlies . . .	100	900,000	10,800,000
Quarterlies . . .	25	29,000	80,000
	2,800	5,000,000	422,600,000

German newspapers.

With an educated people, taking a vital interest in all public questions, the newspaper press is likely to increase even in a greater ratio than it has done during the past decade. The number of German emigrants has caused the establishment of newspapers for their use, and at Cincinnati alone there are four daily newspapers published in the German language.

Type-founding.

Type founding is carried on to a great extent at Boston, New York, and Philadelphia, and there are single establishments in several other of the large cities. The whole of the type used in the United States, besides a large quantity exported to the British provinces and the various States of South America, is produced in these foundries, and the statements made in the Report of the Jury for Class XVII. in the Great Exhibition of 1851, appear to be so far correct, that a reference thereto will be sufficient for all practical purposes here;* and the same may be said with reference to the sketch of the progress of the paper manufacture, given in the same Report.†

Boston type-foundry.

At the type foundry of John K. Rogers and Company, Boston, Massachusetts, machines for casting the smaller bodies of type are in regular use. A pump is used for forcing the melted metal into the mould, and a workman turns out 90 brevier type per minute, and smaller kinds at a more rapid speed. This machine, or an adaptation of it, is in general use in the type foundries of the United States, and some few have been lately exported to England.

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* Jury Reports, 8vo. edition, page 410.

† Idem, page 443.

Machines for casting type.

The larger kinds of type are still cast by hand in the usual way.

Ornamental type.

Ornamental type is not manufactured to any great extent; the forms, however, of the ordinary bodies are neat and elegant, with a clearly-cut edge. The metal used is an alloy of lead, tin, and antimony, each preponderating according to the type required; 75 per cent. of lead, however, is stated as the average of that metal.

Stereotype plates in gutta percha at the Smithsonian Institute, Washington.

Stereotyped titles for catalogues of libraries.

The use of gutta percha for the purpose of stereotype appears to have been extensively experimented upon in the United States; and at the Smithsonian Institute, Washington, a method invented by Mr. Josiah Warner, of Indiana, has been adopted for the purpose of realizing a plan suggested by Professor Jewett for stereotyping catalogues by means of separate titles. The titles of the books to form the catalogue being set up in any convenient number, a matrix is made therefrom, and a stereotype plate cast in gutta percha. This is sawn into the number of titles of which it is composed, and the alphabetising is accomplished by the simple assortment and arrangement of those titles, which are fixed together in the requisite pages. By this means the books added to any library during the year may be inserted in their proper places, and an annual catalogue published at a comparatively small cost, containing all the recent additions to the library.

It must be evident that the gutta percha plates, thus divided into titles, might be used for the formation of matrices from which to cast metal titles, if such are desired. All the practical difficulties in the way of the realization of this plan have been, it is now believed, overcome, and the Smithsonian Catalogue may be shortly expected to illustrate the practical benefits to be derived by public libraries in the adoption of the plan above described.

Specimens of type in the Exhibition at New York.

The few examples of type sent to the Exhibition are good, being generally of pure and tasteful forms, and remarkably clean in the casting.

Combination type.

There are specimens of combination type, exhibited by the manufacturer, Mr. John H. Tobitt, of New York. There is generally, amongst practical printers, a great antipathy to change the form and arrangement of existing "cases;" and, however plausible a plan of combination types, in which a word or portion of a word can be "set up" at a single operation, may be, the single "body" has still the advantage in one important point,—that if damaged, a letter only is lost, instead of a whole word, if but a single letter of which it is composed is injured.

Book-binding.

The specimens of bookbinding exhibited do not call for any special remarks. They are of the usual character, so far as the external appearance is concerned, and the style of gilding and the taste displayed in the decorations are altogether based on European modes: a redundancy of unnecessary ornamentation being the leading feature, as in England.

Account books.

In commercial account books the workmanship and finish are generally excellent.

Stationary.

Of stationery and paper the display is very limited, and the show-cards and labels, exhibited as specimens of ornamental printing, are of average merit.

CLASS XVIII.

PRINTING AND DYEING.

Printed and dyed fabrics.

In the operations of printing and dyeing the fabrics manufactured of cotton, wool, and a combination of the two, the manufacturers of the United States have been largely aided by the emigration of artizans from Europe, who taking with them the experience gained by the almost unremitting attention which has been paid to these important departments of industry during the past half-century in England, France, and Germany, have been enabled to establish on a firm foundation the commencement, at least, of an invaluable adjunct to the manufacturing processes in woollen and cotton goods, now so successfully carried on for the supply of the demands of the American population.

Introduction of calico printing.

The introduction of calico printing has been one of no ordinary difficulty, consequently the results have been of slow growth, and accompanied by many failures. It would appear now, however, to be fairly established; and although dependent in a greater degree probably than in almost any other branch of industry upon the imported skill of British workmen, either as designers, engravers, or printers, yet the tact of the American is nowhere seen to greater advantage than in the steady and skilful devotion of his energies, both manufacturing and commercial, to the development and progression of a trade requiring more than ordinary skill to conduct with pecuniary profit. The fluctuations of fashions, the uncertainty of the style likely to prevail in the market, from the influence exercised by European goods,—the adaptation in colour and quality to an almost endless variety of market,—all contribute to place the beginner at no slight disadvantage; and this applies to a nation as well as to an individual.

No means present themselves for obtaining a statement of the quantity of cotton cloth printed in the United States. The two largest concerns of this class, however, are the Merrimack Print Works, belonging to the Merrimack Manufacturing Company, Lowell, Massachusetts, and that of Messrs. Jacob Dunnell and Company, Pawtucket, near Providence, Rhode Island. The latter was the first establishment of the kind in the United States, and the production of the two concerns amounts to 30,000,000 yards per annum.

Messrs. Jacob Dunnell, and Co., Providence, Rhode Island.

Messrs. Dunnell's Print Works are erected on the banks of the Pawtucket river, and the internal arrangements are excellent as regards the economy of human labour, and the scientific application of the best-known and thoroughly established modes of calico printing.

Madder and steam prints.

In cotton both madder and steam prints are produced; jaconettes and cambrics, under the generic name of lawns, form a considerable portion of the madder work. Mousellines de laine are also printed in considerable

Printed lawns. Mousellines de laine. Printed goods suited to different parts of the United States.

quantities when they are in demand; but latterly this firm has found that steam prints or all wool (de laine) fabrics have been preferred by the class of buyers whom they supply. Steam prints, which have been somewhat out of favour, were again in demand in certain markets, chiefly in the Southern States, and these, though all within the boundary of the Federal Union, require special styles to suit them. Showy patterns, large in form, and strong in contrasts of colour, are those chiefly sold in the South and West. In the Middle States, especially in New England, smaller patterns, more subdued in colour, and approaching to the best character of goods used in England, are required. In fact, in these latter States the neat madder prints find their chief market.

Print shop at Messrs. Dunnell's.

The print shop at Messrs. Dunnell's is very lofty and well arranged, and contains ten machines, all of which are usually at work. In steam prints as many as ten colours or tints have been produced in one pattern: the average is four, and the result is, as usual, more satisfactory. The machines are run at much greater speed than in England, in order to make up, as far as possible, for the higher rate of wages paid in the States. Thus, the workman, having more hours to work, and a greater quantity of work to get through and be responsible for, has his attention ever on the stretch to avoid the production of bad work. The average amount got through is 12,000 pieces per week.

Dye-house at Messrs. Dunnell's.

The dye-house arrangements are within a very small space, considering the work got through.

Untwisting machine.

An ingenious contrivance for untwisting the cloth as it comes from the dye-house is in successful operation, by which one boy does the ordinary work of six men. This untwisting machine receives the cloth through a wooden funnel, similar in shape to the hopper of a mill, into a trough of the width of the fabric, forming an inclined plane. The boy attending to the machine assists the opening of the cloth, which is chiefly effected by an undulatory motion, applied as it descends from the funnel; this partial spreading out is rendered more complete by the passage of the fabric over the curved edge of a piece of wood, across which it is drawn on the ascent up the inclined plane or trough, which conducts it to a series of wooden rollers with spiral edges of brass fixed in their surface. These open the cloth completely, in a similar manner to the iron spreading roller attached to every calico-printing machine.

An adaptation of a French method of using the chloride is adopted. This is effected by passing and wringing the cloth in its open state through the chloride, or "chemick," as it is called in England, and then washing out by passing over three large wooden cylinders placed above each other, over which an abundant stream of water flows as they revolve. The wringing out of the water by other cylinders leaves the cloth perfectly free from all excess of dye and chloride, and it is then dried and folded from the machine.

The drying process is conducted in a very economic manner, by a contrivance somewhat similar to the ordinary washing-machine used after bleaching.

Economy in using steam.

The steam is also economised to a very considerable extent. It is first worked at high pressure, then taken off at 10 lbs. to the square foot for bleaching purposes, and then again at 1 lb. to the square foot for heating the decoctions of dyestuffs. By this means little or no steam is lost, and the saving is said to be about 33 per cent. in fuel over the English method. No steam was visible in the bleach-house, whilst in bleach-houses generally, the upper part is full; and, of course, this is all waste.

Earthenware bleach rings.

The earthenware bleach-rings mentioned in Class XXV, page 121, are used in both the bleach and dye house.

The goods printed by Messrs. Dunnell bear comparison with most of the same class printed in Europe. The steams are clear and bright in colour; the madders, especially the lawn fabrics, clean and well finished; the prints being generally pure and of excellent tint.

English designers and printers.

The designers and printers employed by this firm are nearly all Englishmen. French designs on paper, together with the current styles in cloth, are obtained from Paris; but it often happens that if any of these are produced as soon as obtained, they are too early—in fact, too novel for the home market. Thus a pattern printed one season and unsuccessful from its novelty, has sold well in a subsequent season requiring the same class of goods, the importations from Europe having made the buyers acquainted with the style. For it is a singular fact, that however much these buyers are supposed to give the fashion, and thus rule the market in America as in Europe, their principles of judgment or taste, as it is called, are so low as rarely to enable them to pronounce whether a pattern is good or bad until it begins to sell, or they find it hanging upon their hands. It has thus happened that a style pronounced totally unsaleable, has in a subsequent, or possibly a more advanced period of the same season, become quite the rage. These are points upon which the calico-printer has to calculate, if he can do so, alike on both sides of the Atlantic.

Uncertainty of fashion.

Sale of printed goods.

The goods printed by Messrs. Dunnell are brought into the market by a great sale at auction in New York, at the commencement of each commercial season. All are cleared out at a blow, and this plan appears to have answered their purpose most admirably. The buyers at once take the responsibility of making the goods sell; the printers are left free to attend to their productions for another season, without the necessity of selling out a dead stock at the end of the current year. This appears to be a bold and original course, suited more to the purposes of the American market than consistent with the commercial notions and usages of European manufacturers.

Merrimack print works, Lowell, Massachusetts.

At the Merrimack Print Works, Lowell, Massachusetts, madder colours only are printed. There are twelve machines employed upon these, printing in from one to four colours, and the daily produce is 40,000 yards, or about 8,000 pieces, per week. The goods printed are manufactured in the cotton mills of the same company (see Class XI). These are of excellent quality, and the character of the printing and dyeing places them on a par with similar fabrics manufactured elsewhere.

The patterns are generally well selected, being of a neat character, and similar in many respects to the goods known in England as "Hoyles." The smaller kind for children's wear, are especially noticeable for the same qualities, which render the prints of such houses as Hoyles and Liddiards so much in request in England; and when it is considered that this class of calico print is largely used in the United States for the summer clothing of males, especially for boys, the demand would appear to be far beyond the present means of supplying it.

The Merrimack Company, as also Messrs. Dunnell and Company, contribute largely to the Exhibition at New York, and the goods there displayed, though simply selected from their ordinary productions are characterised by the qualities already indicated.

Quality of water for dyeing and printing.

The water of the Merrimack river appears to be better adapted to the dyeing of cotton than of woollen. This point claimed particular attention at Lowell, from the comparison of the colours dyed for carpets by the Lowell Manufacturing Company, and the dyes at the Merrimack and Hamilton Print Works; and the impression was confirmed on examining the dyes of the cottons and de laines printed at the Manchester Print Works, Manchester, New Hampshire. On mentioning this to the managers of the work at the latter place, he confirmed the opinion I had formed on this point. This question of the selection of a water site for dyeing and printing is a most important one in the United States, since it is quite certain that in no country is there a great variation in this respect.

Hamilton Manufacturing Company, Lowell, Massachusetts.

The Hamilton Manufacturing Company, Lowell, dye and print a large quantity of the goods manufactured by them. The dyed goods are chiefly for the China market, and the home market of the West. These consist of drills, and are usually blue or brown. The average weekly produce in this department amounts to 36,000 yards.

The prints are all madders in from one to six colours, and the weekly work of the five machines employed is returned at 110,000 yards.

The styles of the patterns are generally darker than those of the Merrimack Company, but are good examples of madder work.

The internal arrangements of both the Merrimack and Hamilton Print Works are very good as regards economy and facility for work, but do not call for any special notice.

Manchester print-works,

At the Manchester Print Works, Manchester, New

Manchester, New Hampshire.

Hampshire, both cottons and mousellines de laine are printed; the goods being manufactured by the same Company (see Class XV).

Ten machines are employed, and these print from single-coloured madders up to eight colours in steams, six colours being the average in mousellines de laine.

The cottons printed here, however, are nearly all madders, the designs being of the usual character; about 500 pieces (15,000 yards) being the average weekly production.

Mousellines de laine.

In mousellines de laine, 15,000 pieces (450,000 yards) are printed weekly, and the patterns are mostly of a season later than those of Europe, for reasons already given as affecting the sales. The designs are adapted to the markets, which are chiefly in the Northern and Western States, and the styles are generally showy, rather than elegant.

Scouring grey de laines.

The printing department is well arranged, and the scouring of the grey de laines is now attended to more than it formerly appears to have been, from the quality of some of the colours. Seventeen machines are now used, where formerly eight were considered enough; and the absolute cleanliness of the fabric before printing, seems to be recognised in its full force,—a fact that the scientific printers of France discovered years ago, but which British as well as American printers paid in costly failures for finding out.

Cloth-folding machine.

A folding machine, for grey cloth, is attached to the dyeing machine of the scouring room. It consists of a swing frame with rollers, through which the cloth passes. As the frame swings on a pivot, by which it is attached to the upper part of the frame, it lays out the cloth as it descends from the rollers in smooth and even folds, ready for carrying to the printing-machine, instead of allowing it to be crushed into an unsightly mass as it passes from being dried in the grey.

In printing, the pieces are run up from the machine to drying-rooms, descending again to the machine for examination by the printer. The de laines are folded and carried to the steam, but the cottons are run up to "ageing" rooms, from whence they are in due time run off again to the dunging and dye vats. Carrying about by human labour is thus saved to a very great extent, and a cotton piece is scarcely touched by hand, from the time it enters the machine until it is dyed and has to be untwisted from the wringing after dyeing.

Economical use of steam.

The steam here is economized as much as possible. A small steam-engine is attached to pump the condensed water back into the boilers. Thus water at 120° to 140° temperature is used instead of cold water, and fuel is saved by not allowing the already heated water to run away in waste.

Hamilton Company's print-works, Southbridge, Massachusetts.

Time did not allow of a visit to the Hamilton Woollen Company's Print Works, Southbridge, Massachusetts, but the agent of this Company, in common with those of the Merrimack and Manchester Company, and Messrs. Jacob Dunnell and Company, furnished me with duplicate patterns of the goods contributed by them to the Exhibition at New York. These are good specimens of mousellines de laine. The colours are clear, brilliant, generally well selected and harmonised; the patterns partaking of the usual character. A specimen of cashmere furniture, printed with copper rollers, in the chintz style, in ten colours, is admirable, in the clearness and distinctness of the large masses of colour. The design is of the floral type usually adopted for furnitures.

Printed cashmere furniture.

English and Scotch designers.

The Hamilton Company's Works print about 20,000 yards per week, having four machines at work, and another in the course of erection. They retain four designers, three Scotch and one English, and these produce nearly all the patterns they use.

Engraving of copper cylinders.

A department for the engraving of copper rollers or "shells," as they are generally called in the United States, is attached to each print works, in which the requisite patterns are engraved, and the workmen employed are chiefly Englishmen.

Invention applicable to the use of copper cylinders in calico printing.

As an improvement in the use of the ordinary rollers and the mandril, an invention has been lately patented, as applicable to the use of copper shells, by which a great weight of copper may be saved by making the shell itself very much thinner, and inserting therein another roller with a grove or slit running longitudinally, into which a mandril is fitted with a metal notch running down the slit, thus expanding the internal roller to the full circumference of the inside of the copper shell, and rendering the whole sufficiently firm and solid for use in the machine. The value of this mode of using copper cylinders in printing has, however, yet to be tested. The saving in the weight of copper at present employed will be considerable if the invention succeeds, and the necessity for "turning off" a pattern will be also superseded, and a standard circumference may be adopted for the cylinders, with a gain in the comparatively small amount of metal required to constitute the thickness of the "shell."*

Printed table covers.

Felted table-covers of a good quality are printed at the Bay State Mills, Lawrence, Massachusetts. These are entirely blockwork.

Printed silk handkerchiefs.

Silk handkerchiefs, of India fabric, imported in the grey, are printed at the Falls of the Schuylkill Print Works, near Philadelphia. Specimens of these are displaped in the Exhibition at New York, and show good work.

Printed goods exhibited at the New York Exhibition.

The specimens of printed goods exhibited are, on the whole, fairly representative of the present state of this branch of industry in the United States, and evince progress of no ordinary kind.

Printed cassimeres and satinettes.

Printed and "extracted" cassimeres and satinettes for trouserings and vestings is a novelty, and the specimens exhibited, as also those produced by the Middlesex Company, Lowell, are calculated to give a favourable impression of the character of this mode of dyeing woollen goods for general use. European prejudices would undoubtedly be against such modes of finishing the surface of such materials; but in the United States a novelty of this kind, commended by cheapness and fair appearance, readily finds appreciation, or, at least, obtains a trial of its merits.

CLASS XIX.

CARPETS, &c.

Carpet manufacture.

The manufacture of carpets appears to have been of steady growth. Commencing with the cheaper and more useful kinds, or, at least, those most in demand, it has progressed until it now forms a very important item in the industry of the United States.

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* This proves now to be a recent English invention by the late Mr. Richard Prosser, C.E., of Birmingham. G.W.

In the New England States, where it is carried on to the greatest extent, the weaving may be said to be altogether by power. Hand-loom weaving, however, is still the chief means of production in the States of Pennsylvania, Delaware, and Maryland, and the manufacture consists of two and three ply Kidderminster, Venetian, and a little Brussels. The out-door or domestic system, as it may be called, prevails to a considerable extent, although there are factories in which looms are set up. One of these at Philadelphia has generally from 200 to 300 at work, and the proprietors employ out-door weavers in addition. This system has already been alluded to in Class XI, as applied to the manufacture of checks, tickings, &c. The weaver takes out work from the manufacturer, and the master weaver, or "boss," as he is called, employs other weavers to work, probably three or four looms, in a shed attached to his own house. He is responsible to the manufacturer from whom he receives the materials, and to whom he delivers the work when completed, and receives payment, giving such wages to his workmen as leaves him a small profit for superintendence, use of looms, &c., supposing the latter are his own property, which is frequently the case. In fact the system pursued in the States above named is similar to that which still exists in some of the manufacturing districts of England, except that the American "boss"* is a nearer approach to a small manufacturer making up the materials of another.

Domestic system of weaving in Pennsylvania, Delaware, and Maryland.

The wages of the working weavers vary from $8 to $12 per week, the average being about $10 — say £2 1*s.* 8*d.* sterling. This rate is given on the authority of a carpet manufacturer at Philadelphia, and one of his master weavers.

Wages of hand-loom carpet weavers.

The rag carpets manufactured by the prisoners of the Maryland Penitentiary, Baltimore, have been already mentioned when reporting upon the other industrial productions of that prison.

Rag carpets.

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* The term "boss" is also generally used in the United States instead of "master" or "employer."

Lowell Manufacturing Company, Lowell, Massachusetts.

The Lowell Manufacturing Company, Lowell, Massachusetts, manufacture carpets very extensively, employing 200 power looms, producing 25,000 yards per week. The goods consist of two and three ply ingrain, and are good fabrics of their class, being firm in make and excellent in dye, so far as permanence of colour is concerned. In some colours, too, there is much clearness and brilliancy, but, as already stated (Class XVIII), the water of the Merrimack appears better adapted to the dyeing of cotton than of wool. The designs are varied, and of the usual character of such goods.

Designers for carpets.

The designers employed are French and Scotch. Two female students of the Boston School of Design are engaged, who, after a fair trial and the requisite technical instruction, have been successfully employed in "drafting." They have also made one or two very creditable attempts in design.

Tufted and chenelle rugs.

Tufted and chenelle rugs also form a part of the productions of the Lowell Company's Carpet Works, about 50 per week being manufactured.

Thompsonville Manufacturing Company.

A very complete establishment for the manufacture of carpets of various kinds is situated at Thompsonville, Massachusetts, erected and worked for a considerable period by the Thompsonville Manufacturing Company. The works, however, had not been in operation for several months at the date of my visit.

The specimens of goods shown were of a fair quality; the arrangements of the engine-house, mill, weaving-rooms, dye-house, &c., being very complete, and of a most substantial character. When in work, 27 carding engines are employed. There are 127 power looms for ingrain carpets, turning out, when at work, from 25 to 28 yards each per day; and 7 power looms for Venetians, usually making 125 yards each per day. The hand looms comprise 42 for Brussels, 10 tufted rug looms, 16 setting Axminster, and 4 filling looms. This establishment being about to pass into other hands, would in a few weeks from the period at which the above information as to its capabilities was obtained, be again in operation; but great difficulty was anticipated in getting together the requisite

Difficulties in obtaining skilled operatives.

number of skilled operatives, as those formerly employed have sought and obtained employment in other districts.

In this respect the American manufacturer is peculiarly situated, and he must often carry on his business at little or no profit, perhaps at a considerable loss, in order to keep together the agents by which, when the demand comes, he can alone supply it. Hence the anxiety to settle down the operatives around the mills; to render their condition and social position such as shall absolutely attach them to their employers and the locality. The latter, perhaps, being the most difficult, from the migratory tendencies of a people so restless, and always so alive to any new contingency which promises to better their condition, however distant the field of operation may be.

Bigelow Carpet Company, Clinton, Massachusetts.

Power-loom Brussels carpet.

The most interesting carpet manufactory in the United States is, without doubt, that of the Bigelow Carpet Company, Clinton, Massachusetts. In this establishment the manufacture of Brussels carpets by power is fully and completely carried out, and a fabric manufactured, which, for evenness of surface, fineness and strength of make, is of a most unexceptionable character.

There are 30 power-looms always in full work, weaving 5-frame Brussels carpet. The production of each is from 20 to 24 yards per day; in special cases 32½ yards are manufactured. Pieces of 60 yards each, of the widths ¾, ⅞ and, 1 yard, constitute the usual make. The "fit" or "register" of the patterns is of the most accurate character; thus giving a great advantage in the making up.

The weavers are all females, one attending each loom.

The dyes are excellent, the water being obtained from wells sunk for the purpose. Its quality is evidently favourable to the more brilliant colours, the reds and blues being especially clear and bright.

The designs are of the usual character, chiefly floral, though a few good geometric diapers indicated a tendency to a more healthy style. The patterns are generally well drawn and coloured, and are of European production.

Power-loom velvet pile Brussels carpet.

An experiment was going on in a new loom, or rather a new application of the present loom, in the manufacture of velvet pile. By an arrangement of the wire, a knife-blade, with the edge uppermost, forms one end, and when this is drawn out by the action of the machine it cuts the pile. In order to secure the face-threads, two picks had to be thrown into the back for one at the face of the fabric, and the problem in the course of solution was the relative proportion of these threads. The results of the experiment were so far satisfactory as to show that success was certain, and that when once the splitting or division of the pile, by the tension occasioned by the back threads being too thick, was accomplished, a beautiful fabric would be the result. The produce of the experimental loom was about 15 yards per day, and it was anticipated that this would be the average in the other looms in course of construction.

Printed felt carpets.

The printed felt carpets manufactured and printed at the Bay State Mills, Lawrence, Massachusetts, are remarkable examples of their class. The patterns are generally well selected, and suitable to the fabric, the colours good, clear, and brilliant; whilst the printing is more accurate in fit than is usually found in this class of goods. These felted carpets sell at 90 cents (say 3*s.* 9*d.* sterling) per yard of 2 yards wide.

Carpets in the Exhibition at New York.

The carpets exhibited in the New York Exhibition are of a very miscellaneous character, many being imported. Those of American manufacture, however, are generally such as above stated; the best being "ingrain."

Floor-cloths.

The manufacture of floor-cloth appears to be one in which, ultimately, the Americans will succeed, so far, at least, as the use of the materials is concerned; the dry character of the atmosphere being very favourable to the rapid drying of the work.

False principles in design.

There are a few admirably printed specimens in the Exhibition, but, with the exception of one pattern, in imitation of oak *parquetage*, they are as thoroughly wrong in design, and as antagonistic to everything like the true principles of floor decoration, as the generality of such things are in England. For instance, one specimen has its surface ornamented with a portrait of Washington, and a view of Mount Vernon alternating in panels, surrounded by a wreath of flowers and the American eagle! Yet this is intended for a floor-covering, and of course to be walked upon!

Coach lace.

Coach lace is manufactured in considerable quantities in some of the New England States.

Clinton Manufacturing Company, Clinton, Massachusetts.

The Clinton Manufacturing Company, Clinton, Massachussetts, have 100 looms employed in the production of coach lace, the materials being varied according to quality, and consisting of, more or less, worsted, cotton and silk. The designs of some of the best qualities, in which silk is freely used, are very good. The looms are of the same construction as the Brussels power loom; in fact, the latter is an extension of the principle of the coach-lace loom, since the invention was first applied to the manufacture of coach lace.

Fringes, tassels, &c.

The manufacture of fringes, tassels, &c., appears to be exceptional (see Class XX), but the specimens contributed to the New York Exhibition are, generally of fair make.

Embroidery.

Embroidery appears to form but a very small item in the industrial productions of the United States, although in the Exhibition there are numerous contributions of ladies' work, chiefly in Berlin wool and embroidered quilts.

The specimens of commercial embroidery are generally good, and in New York, as in other large cities, persons are employed by the various millinery and upholstery establishments in needlework decorations for articles of dress and furniture.

CLASS XX.

WEARING APPAREL, &C.

Clothing, &c.

As might be expected, the manufacture of ready-made clothing forms an important item in the industry of the people of the large cities of the States, such as

New York, Boston, and Philadelphia, and that, in a country where male labour is in such demand, females are more largely engaged, and, on the whole, better paid for their work than they are in Europe. Still, during the last summer, attention has been called to the condition of the needlewomen—especially the shirt-makers of New York, and facts brought to light of a parallel character to those which a few years ago formed such prominent points in an inquiry into the industrial and social position of the same class of females in London.

Condition of needle-women in New York.

The general statistics of the clothing trades, spread, as the various occupations connected therewith are, over the whole country, presented so many difficulties that, after several attempts to obtain accurate information on this point, I was compelled to abandon it. There can be no doubt, however, that could accurate data be obtained, the result would be of a very extraordinary character; as in a country where all classes of the people may be said to be well dressed, and where the cast-off clothes of one class are never worn by another, the manufacture of the cheaper kinds of clothing must be carried on to an enormous extent.

Manufacture of clothing at Cincinnati, Ohio.

Cincinnati, Ohio, appears to be a great central depôt of ready-made clothing, and its manufacture for the Western markets may be said to be one of the great trades of that city. The system pursued is that chiefly of out-workers. The articles of dress being cut out in large quantities in the warehouses of the dealers or manufacturers, and distributed to those who undertake to make them up at their own houses, or to master tailors or "bosses," who, paying the hands they engage either by the piece or by the day, undertake the making up of large quantities of clothing. The various sewing operations are carried on by the latter in workshops, in most instances well adapted to the peculiarities of the trade, and latterly sewing machines, of varied construction, have been largely employed. In one of these establishments, the manager or "boss," stated that a person skilled in the use of the machines in operation there, would do as much work as ten ordinary needle-women, and that by those in which the needles acted

Sewing machines.

vertically, any character of seam required for ordinary clothing, either in right lines or curves, could be sewn. The successful action of this machine is further exemplified in the manufacture of boots and shoes, so far as the stitching of the upper leathers is concerned.

Manufacture of clothing in the Western States.

At Louisville, Kentucky, and St. Louis, Missouri, the manufacture of clothing is also extensively carried on; but Cincinnati may be considered as the great mart of ready-made clothing for the Western States, and, in a measure, for those of the South also. In 1851 there were in the latter city 108 establishments, employing 950 hands in their own workshops, and upwards of 9,000 females, either at their own homes or under "bosses." The proprietors are chiefly German Jews, and most of the operatives are Germans.

Under-clothing.

Under-clothing, as made up from the piece, such as shirts, &c., is manufactured upon the same system, and mostly by the same firms. This applies generally throughout the larger cities.

Stocking-net, hosiery, &c.

The manufacture of stocking-net, and of hosiery of the coarser qualities, is gradually developing itself in various localities, especially in the States of Connecticut and Massachusetts.

Waterbury, Knitting Company.

The Waterbury Knitting Company, Waterbury, Connecticut, manufacture cotton drawers, under shirts, and merino wool knitted articles. By a regulation of the directors, however, strangers are not allowed to see the machinery; but judging from the character of the goods, the machines are, in all probability, either of French construction, or upon the same principle as the circular looms of Jouve or Gillet. The former has a patent right for the United States, which is held by the Enfield Manufacturing Company, Thompsonville, Massachusetts. This establishment is under the direction of an Englishman, Mr. W. G. Medlicott, and 400 operatives are employed. There are 3,000 spindles for cotton yarns, and 13 sets of carding engines for wool. The company has at work 58 circular knitting-machines of various dimensions, after the invention of Jouve, of Belgium, for which, as above stated, it holds the patent right, and 23 machines made by François Gillet, of Troyes, France. The articles produced are knitted

Enfield Manufacturing Company, Thompsonville, Massachusetts.

Circular knitting machines.

cotton drawers, under-shirts in cotton, cotton and wool, and all wool. All these are of fair average quality and make.

Flastic webbings, suspenders, &c. Messrs. Hotchkiss, and Merriman, Waterbury, Connecticut.

Elastic webbings used in the making up of clothing, suspenders, gaiters, &c., are manufactured in the State of Connecticut; and the establishment of Messrs. Hotchkiss and Merriman, Waterbury, affords an illustration of the extent and mode of operation. There are several other concerns of a similar character, but this appears to be the largest. They spin the cotton yarn in one factory where 200 persons are employed, manufacture the buckles and metallic mountings in another, and at a third factory the elastic webbing is produced; the threads of caoutchouc for intermingling with the warp being prepared on the premises, the weaving of the webbing being effected by power. About 150 persons are employed in the latter factory, where the webbing is afterwards cut to the requisite sizes for the various articles into which it is to be made up, the leather trimmings punched out to the proper forms, and then assorted into convenient quantities with the necessary metallic appendages. The materials thus prepared and assorted are distributed in the villages and farm-houses around, to be made up by females, in many instances at their hours of leisure from domestic employment, and by others as a means of obtaining a livelihood. Even little children, under the age at which the law of the State allows of their employment in manufactories, can be usefully engaged in some portions of the work thus undertaken at home. A waggon is used for sending round the materials and collecting the finished work. This visits a given district at stated periods, taking out fresh work and bringing back that distributed on the former journey. About 600 persons are thus employed at their own houses by Messrs. Hotchkiss and Merriman.

Domestic employment in making up elastic fabrics.

The goods are made up into dozens and half-dozens, and usually packed in ornamental boxes for distribution to the retail dealer. They consist of the commoner kind of such articles as used in England, but are of excellent make and quality.

It will be seen that the method pursued in the making up of these articles is similar to that adopted in

Scotland and the north of Ireland by the embroidery houses of Glasgow and Belfast.

Boots and shoes.

The boot and shoe trade of the United States is of a very extensive character, and the systematic manner in which it is carried on worthy of being understood and adopted elsewhere. A scale or series of sizes is adopted, say in women's and children's shoes from 1 to 6, nad even higher numbers, the half constituting a size between each. The various portions of the boots and shoes are cut out to these sizes and half-sizes. These are put up with all the requisite trimmings necessary to complete the articles, in sets of 60 pairs for the common kinds, and 24 pairs for the finer qualities.

System of manufacture of boots and shoes.

Being cut out and made up into sets, they are sent to be "fitted" for the maker—that is, the various parts of the upper leathers are stitched together. Much of this is now done by one of the various kinds of sewing machines in which the needle acts vertically, as the force required to pierce the leather is more directly applied than in those in which the needle acts horizontally or in a segmental curve. The neatness, accuracy, and strength of stitch is superior to hand work. The upper leathers thus "fitted" are then sent to the "binder," who finally prepares them for the "maker," by whom they are soled and heeled. Being complete in make they then go to the "trimmer," whose work consists in punching the string holes, stringing and putting on buttons, and in ladies' shoes, bows, rosettes, &c.

Cutting ou sole leather by machinery.

Soles are cut out by machinery. A knife with a curvilinear edge is set in a frame and worked with a treadle after the manner of a lathe. By a lateral motion in the machine it can be adapted to the cutting of any requisite width of sole, and being once fixed to a given width, the process of cutting is very rapid, and material is saved by the leather being cut at right angles to the surface, instead of diagonally as by the ordinary knife.

When finished the goods are made up in boxes containing 1 dozen of assorted sizes. They are then sent in cases to the wholesale dealer who supplies the retailer. A case contains 5 boxes, making up the 60 pairs of assorted sizes of which a set of the commoner kind consists as manufactured.

Boots and shoes are manufactured and the workmen reside in all parts of the New England States, but chiefly in the States of Massachusetts, Maine, Vermont, and New Hampshire.

Gentlemen's boots.

The finer quality of boots for gentlemen are chiefly made at Randolph and Abington, Massachusetts; the heavier kind of shoes, and the coarsest kind, usually called "brogans," at Danvers, in the same State. These "brogans" are chiefly manufactured for the Southern markets, for the use of slaves, and are similar to the shoes worn by the miners of South Staffordshire.

Brogans, or negro shoes.

Ladies' and children's shoes.

Shoes for females are chiefly made at Lynn, Reading, Woburn and Haverhill, all in the State of Massachusetts.

The following table, compiled from the "Statistics of the Condition and Products of certain branches of Industry in Massachusetts, for the year ending April 1st, 1845," will show the extent of the boot and shoe trade in the six above-named towns at that date:—

Amount of production in boots and shoes, 1845.

Towns.	Kinds.	Number of Pairs made.	Males employed	Females employed.
Randolph	Boots Shoes	227,131 332,281	815	649
Danvers	Both	1,150,300	1,586	980
Lynn	Boots Shoes	2,000 2,404,722	2,719	3,209
Reading	Shoes	274,000	358	385
Woburn	Boots Shoes	909 350,920	425	484
Haverhill	Shoes	1,860,915	2,042	1,680

At the last-named town 129 machines were employed in cutting sole leather.

Lynn, Massachusetts.

Lynn is still the town most extensively engaged in this trade, and, as regards the methods of business and routine of manufacture in the article of ladies' shoes, an extract from the report of the Sanitary Commission of Massachusetts, 1850, is here quoted.

"It requires, on the average, about sixty days to convert stock into articles ready for final sale; and in the process several classes of persons are employed. The head manufacturers furnish the capital, and superintend the whole operation. The warehouses or stores of the better class generally contain, 1, a counting room, where the general business is transacted; 2, a leather room for keeping the soling leather; 3, an upper stock room; 4, two clicker's or cutter's rooms, one for the upper leathers, and one for the 'stuffs,' or soles; 5, the bound shoe room; 6, the trimming room; 7, the sales and packing room. A 'last' room, and others of less importance, are also sometimes provided. The stock is put into the hands of the 'clickers,' who cut it into 'sets' of shoes, varying somewhat in number and size, from 28 to 50, Nos. 2 to 7, according to the size and quality of the stock. These sets are numbered, recorded, and packed in boxes, to be sent to the operatives or workmen, to whom they are charged. When returned, they are credited, and go into the trimming room, where they are finally prepared, by females, for market. They are afterwards taken to the sales-room and packed. Generally the sets, as they go from the cutter, are kept together until their final sale. These shoes are sold at the warehouses of the manufacturers, and are seldom or never consigned.

Time required to convert stock into boots and shoes.

System of preparation.

"The 'closing' and binding of the shoes is done by females or 'binders,' and the other parts, or 'bottoming' by males, or 'workmen,' 'jours,' or 'journeymen.' These operatives do not live in Lynn exclusively, but many of them reside in other parts of the State, and in Maine, New Hampshire, and Vermont. The binders receive from 2 to 5 cents per pair for children's shoes, 3 to 5 cents for misses', 3 to 9 cents for ladies' shoes, and 6 to 12 cents for gaiter boots. The workmen receive for bottoming, or making shoes, 5 to 17 cents for children's, 10 to 20 cents for misses', 10 to 25 cents for ladies, and 15 to 33 cents for gaiter boots. All the labour is paid for by the piece. Idle time here receives no compensation, and none need be spent. Full employment can always be obtained by competent workmen. The binders earn from $3 to $4, and the workmen from $3 to $9 per

Wages of boot and shoemakers.

week, according to inclination, ability, and time employed (the latter averaging about $5), out of which they pay their board, which in Lynn is $2 to $2½ for males, and $1¼ to $1¾ for females. The net earnings of the females are about half as great as those of the males. The females seldom bottom the shoes, though they might very properly do it.

"Some of the workmen manufacture small lots of shoes on their own account, which they sell to other manufacturers; or have shops, in which they let to other workmen or journeymen 'berths,' or the right to place and use their 'kits.' These shops are commonly small buildings in a yard near the dwelling-house, or rooms in the barns. The price paid for a berth is $1 50 cents, $3, and sometimes $5 annually, according to accommodations, the inmates agreeing to share equally in the expenses of warming the rooms. The chips of their work are saved when fuel is not needed, and burned with wood in box stoves open at top, when it is needed; and, in many shops, these chips supply nearly half the fuel. Very little coal is burned."

A return, of which the following is an abstract, was kindly furnished by Mr. Alonzo Lewis, of Lynn, who has devoted special attention to the statistics of the manufactures of that place. This shows the present state of the boot and shoe trade in that locality.

Statistics of the boot and shoe-trade of Lynn.

Shoe manufacturers—men who manage the business and employ workmen	167
Cutters—men who cut the shoes and shape from the stock	321
Cordwainers—workmen who make the shoes ..	4,132
Binders—females who bind the shoes	7,170
Number of pairs of shoes of all kinds made 1852–53, including women's and children's shoes, boots and gaiters	4,952,300

Value .. $3,706,000, say £742,000.
Capital employed 1,500,000, „ 300,000.

Character of the operatives.

The boot and shoe trade, as carried on in the United States, is altogether of a domestic character, although, from the methods adopted, it partakes of the essential features of a well-regulated factory system. The character of the operatives stands very high for intelligence and probity, and such is the confidence of the manufacturers that they never ask for a reference, still less for a security, when a new hand applies for work; and instances of the loss of materials by the dishonesty of the workmen are very rare indeed. Sets of shoes have been lost occasionally through intrusting them to travelling shoemakers, who afterwards proved to be professed vagabonds; but this has never yet affected the integrity of the workers generally.

Distribution of the materials.

For the convenience of the operatives residing in distant localities, the materials, in their prepared state, are collected from the manufacturers by express-men or carriers. These deliver them to the workman for whom they are intended, and on receiving the work made up, delivers that to the manufacturer, and then receives the payment due to the former for their labour. The remuneration of these carriers is generally a small per centage on the amount.

Domestic manufacture.

The "brogans," or "negro shoes," are often made by small farmers, who fill up their leisure time with shoemaking, especially in the winter, when out-door labour cannot be attended to. The ready-money thus obtained contributes very materially to the comfort of this class of persons, and they pride themselves upon paying the State taxes when they are proprietors, and a great portion, if not the whole, of their rent when tenants, with the proceeds of their handicraft.

Boots and shoes exhibited at the New York Exhibition.

The examples of boots and shoes contributed to the Exhibition at New York are very numerous, and illustrate in a satisfactory manner the skill and ingenuity employed in this department of industry. The taste displayed in the ladies' shoes is very considerable, whilst the excellence of workmanship, especially in gentlemen's boots, shows how thoroughly the division of labour which prevails in this manufacture is favourable to satisfactory results.

Manufacture of hats.

The manufacture of hats, in all the varieties of wool, fur, silk, and cotton felt, is largely carried on in the States of New York, New Jersey, and Connecticut. Time did not permit of any examination into the methods and processes of manufacture, but in all probability these differ very little from those of England and France. No statistics, as to the extent of the hat trade could be obtained without much personal inquiry, but there is no doubt this department of industry has increased enormously during the past eight or nine years, and that great improvements have taken place in the quality and style of the hats manufactured. There is a highly satisfactory display of specimens of almost every kind of hat produced in the United States in the Exhibition at New York, and all, or nearly all, of these present unexceptionable evidence of skill in manufacture, and considerable taste in the style and finish.

Hats in the Exhibition at New York.

Straw-bonnet trade.

The straw bonnet trade gives employment to a large number of persons in New York city as sewers, as also in several distinct localities in the New England States.

Imported straw braid or plait.

The straw braid or plait is chiefly imported from Italy, France, Germany, England, Switzerland, and China, and embraces nearly every quality; the latter (Canton straw) being largely used for the Southern markets, which are chiefly supplied by the New York manufacturers. "Swiss lace" has been latterly in the greatest demand for bonnets, and the importations of the other kinds have been proportionably less. A coarse straw is obtained from Canada, which is chiefly used for the manufacture of men's hats.

Manufacture of straw braids or plaits.

The domestic manufacture of straw braids or plaits is almost exclusively confined to the New England States. These consist principally of split straw, narrow and fine, and almost equal to the English. Also, of a small proportion of Devon, a wide straw braid of an inferior quality; and of single 11, and other braids in smaller quantities and of inferior qualities. The English "patent" and "whole" straw have been imitated in New England, but with little success.

Manufacture of straw bonnets and palm-leaf hats.

In the manufacture of bonnets, besides the New England States and New York city, a little is necessarily done in nearly all the large cities. Palm-leaf hats, for men and boys, are made up at Worcester, Massachusetts, and other parts of New England, in large quantities. The "Shakers," in several of their communities, manufacture a close cottage bonnet of the same material.

Straw-sewers, New York city.

The number of straw hats made up in New York has been estimated at upwards of 1,000,000 per annum, and there are probably from 2,000 to 3,000 sewers engaged in making up straw hats during the season, the average wages of which are probably $3½ (about 15*s.* sterling) per week. The work is done either at the homes of the workers or in workrooms provided by the employers, according to the system adopted by the latter; in some instances, both "in" and "out" workers are employed. The same complaints of unremunerated labour, as already quoted in the case of the shirt-makers, are made by the straw-sewers, and the relation of this class of female operatives to their employers is very similar to that which exists in London and other large cities.

Bonnets exported from England.

The bonnets exported from England would find a much readier and more extensive sale in the United States, if style of make was more attended to, and more of the elegance found in the French articles thrown into their manufacture. As it is, the best houses procure their styles and patterns from Paris, and these are imitated as far as possible, in the making up of the imported braids by the New York sewers.

Southern markets for straw goods.

In the Southern markets the demand for straw goods is continuous throughout the year, owing to the warmth of the climate; in the Northern States, however, it is chiefly confined to the spring and summer.

Value of straw goods imported and manufactured.

The value of the importations in straw goods, that is, in the braid or plait, and made up, has been estimated to amount to $4,500,000, or about £900,000 sterling, and the value of those of American manufacture to about $500,000, or about £100,000 sterling.

Military clothing and accoutrements at the Exhibition at New York.

The demand in the United States for military clothing and accoutrements is very great, from the extent to which the formation of volunteer corps is carried, and the trade thus created is an important one.

The military costumes exhibited at New York are of a very varied character, the contributions of Messrs. Horstmann and Sons, of Philadelphia, being the most important. The varied manufactures of this house ought, strictly speaking, to be classified under the heads of Class XIII, Silk, in which the ribbons, &c., have been already alluded to; Class XIX, Lace, and Class XX, Clothing (that now under consideration), as also Class XXII, Ornamental Metal-work. For convenience, however, it is placed here, because the exhibits are under this head in the Exhibition at New York, and the chief productions are military clothing and accoutrements.

Messrs. Horstmann and Sons, Philadelphia.

The manufactory of Messrs. Horstmann is the most complete of its kind in the United States. In the weaving department, gold lace, silk fringes, bindings, &c., are woven by power in looms to which, as required, the jacquard machine can be applied, as already stated (Class XIII), for the manufacture of ribbons. Hand looms are employed in the manufacture of braiding. Machines of beautiful construction are used for covering cords with silk and gold thread, and by a proper adjustment these produce a pattern on the surface of the cord. As the work done is of a very high character, as regards quality and make, the speed of the machinery is much slower than usual, a low-pressure engine supplying the power.

Gold lace, silk fringes, and braidings.

Military ornaments.

The manufacture of military ornaments forms another department. Electro-gilt brass ornaments, sword-handles, scabbards, and the usual bullion decorations, being produced on a very extensive scale. The sword-blades are all imported, chiefly from Germany.

Messrs. Horstmann are the recognised manufacturers of military equipments to the War Department at Washington, and the military clothing, &c., contributed to the Exhibition at New York are of a very high character, alike as regards design and execution. Having recently erected a very large and well-arranged factory within the city of Philadelphia, the whole establishment presents an example of system and neatness rarely to be found in manufactories in which handicrafts so varied are carried on. Female labour is, of course, largely employed in the weaving and making-up departments, and formerly in the cutting of fringes. This, however, is now performed by a machine with a circular knife, so arranged as to cut the thread on the diagonal. The double fringe as it leaves the loom, being either run off the beam or placed upon a roller for that purpose, is divided much more exactly than it could be by hand, and at so rapid a speed as scarcely to admit of a comparison with hand labour. Any width of fringe can be

Fringe-cutting machine.

thus cut, the machine being so constructed as to be easily adapted thereto.

IRON AND OTHER METAL MANUFACTURES.

INTRODUCTION.

Iron manufactures. Introduction.

The present extent and future prospects of those manufactures, already fairly established in the United States, in which iron is the principal material used, required a much more extended and detailed examination than time and the distance to be travelled over would permit of my devoting to them, when taken in connection with other departments of industry requiring equal attention. The progress of the past ten or twelve years would appear, on all hands, to have been very great; and many establishments which were scarcely commenced at the beginning of that period, are now in a position to stand a fair comparison with similar manufactories in England.

Pennsylvania is the largest iron-producing State in the Union, although by the census of 1850, twenty-one States are returned as producing pig iron, and only two, Florida and Arkansas, as not having establishments for the manufacture of iron castings; whilst in nineteen States wrought iron is made.

Pig iron.

In the production of pig iron 377 establishments were in operation in 1850, and of these 180 were in Pennsylvania, 35 in Ohio, and 29 in Virginia; the remaining 18 States having a much smaller number each.

Capital invested in the manufacture of pig iron.

The capital invested amounted to $17,346,425 (about £3,569,000 sterling); the produce being 564,755 tons per annum, employing 20,298 males and 150 females.

Iron castings.

In the manufacture of iron castings, 1,391 establishments were engaged; of these 643 were in the States of New York and Pennsylvania,—323 in the former and 320 in the latter; 183 others being in the State of Ohio. The capital invested amounted to $17,416,361, or about the same amount sterling as in the manufacture of pig iron. 322,745 tons of castings are produced per annum, giving employment to 23,541 males and

Quantity and yearly value of iron castings.

48 females. The value of the castings, and other products, being estimated at $25,108,155, or about £5,021,000 sterling.

Wrought iron.

Wrought iron is manufactured at 422 establishments in 19 States. Pennsylvania has 131, New York 60, New Jersey 53, Tennessee 42, and Virginia 39; the remaining 97 being situated in 14 other States. The capital invested was $14,495,220, or about £2,899,000 sterling; 13,178 males and 79 females being employed. The quantity manufactured amounted to 278,044 tons, the value of which, with other products, was $16,747,074, or about £3,349,500 sterling.

Quantity and yearly value of wrought iron.

There can be no doubt that a very considerable increase has taken place in the make and manufacture of iron since the returns, from which the above facts were taken, were made in 1850; and from the energy, enterprise, skill, and industry of all concerned in this manufacture, and the importance attached to it as a permanent source of national wealth and prosperity, its future progress cannot fail to be more than commensurate with that of the last few years.

Miscellaneous articles in iron and brass.

The manufacture of articles of utility in metal, especially iron and brass, is chiefly carried on in the States of Connecticut, and the cities of Philadelphia, Pittsburg, and Cincinnati, as also to a very considerable extent in Boston, New York, and Baltimore, in all the departments connected with ship-building and heavy machinery.

The manufacture of the lighter articles in metal appears to be chiefly located in the State of Connecticut, in the valleys of the Naugatuck and Housatonic; the mills and manufactories being built on the banks of those rivers and the smaller streams running into them, from which the requisite power is derived to drive the machinery employed. Thus, those natural advantages which presented themselves for the promotion of manufacturing enterprise in the cotton and woollen trades in the larger streams of the New England States, such as the Connecticut and Merrimack rivers, are equally obvious in the smaller streams of the State of Connecticut, and have been as readily seized upon for the establishment of a variety of metal trades in which, in addition to skilled handicraft, a large amount of highly ingenious machinery is constantly and most successfully employed. These various trades will be considered under their respective heads.

CLASS XXI.

CUTLERY AND EDGE TOOLS.

Cutlery.

The present position of this department of manufacture can only be illustrated, with one exception, by consideration of the contributions to the Exhibition at New York, since time only permitted of a visit to a single manufactory—that of the Waterville Manufacturing Company, near Waterbury, Connecticut. At this establishment pocket cutlery only is made.

Waterville Manufacturing Company, Waterbury, Connecticut.

About 100 workmen are employed, and amongst them a few Sheffield workmen. Nearly all kinds of the pocket cutlery, of the best qualities, are made, and the taste displayed in the forms and general getting up of the goods is excellent. The materials, more especially the steel, used being of the best quality, the goods, of course, correspond; and from their excellence in temper as well as in finish, are in constant demand.

Pocket cutlery.

The factory is very systematically arranged, affording every facility for the economic production of the articles manufactured. The stock of materials of all kinds constantly kept on hand is necessarily large, as there is no possibility of obtaining a supply on any sudden emergency, as no similar establishment is to be found within a considerable distance. Everything is, therefore, as far as possible, made upon the premises, and portions of pocket-knives, the making of which, in England, almost constitute trades of themselves, are here produced in the ordinary routine of business, owing to the isolated position alike of the manufacture as of the manufactory.

Pocket and table cutlery at the Exhibition at New York.

The pocket cutlery displayed at the Exhibition at New York is generally of good quality and tastefully got up, and to the specimens of table cutlery the same remarks apply.

Edge tools.

In the larger kinds of edge tools there are some admirable illustrations of the extent to which the manufacture of these useful articles is carried on, and of the attainment of a high degree of excellence, both in material, workmanship, and finish. Screw augurs and augur-bits of graduated sizes, patent expansion-bits which set to any size, and sundry carpenters' and other tools, all displaying either improvement in construction or excellence of finish and make.

Screw augurs.

A button-hole cutter of ingenious construction, with a guage to measure the size of the button-hole, and two or three assortments of tailors' shears, are admirably adapted to the uses for which they are intended, the finish being unexceptionable.

Button-hole cutter.

The largest and most extensive display of edge tools is made by the Collins Manufacturing Company, Hartford, Connecticut. These consist of axes, adzes, &c., together with hammers of various sizes, pickaxes, and the ordinary run of heavy tools. Other houses exhibit hammer-heads of good workmanship and material.

Axes, adzes, hammers, &c.

The imperfect manner in which, from the cause already assigned, this department of industry in the United States was examined, is to be regretted, as from the examples shown at the Exhibition, its successful prosecution is apparent, so far at least as the more useful articles in constant demand in such a country are concerned. That a considerable number of European workmen are employed in this manufacture would appear to be more than probable, as the finish of the articles often shows an amount of skill only attainable through long practice. In the manufacture of files, for example, the best workmen are invariably Englishmen.

Files.

CLASS XXII.

IRON, BRASS, AND GENERAL HARDWARE, INCLUDING LAMPS, CHANDELIERS, AND KITCHEN FURNITURE.

Manufactures in iron.

In nearly all the large cities, iron foundries of greater or less extent are to be found, cast-iron being largely employed in the construction of buildings both of wood and brick ; and in Philadelphia, as also to some extent in other cities, whole elevations of houses, used as retail shops in the principal streets, are of cast-iron. In these cases the construction of the building is usually modified to suit the material of the front, and, in some instances, an approximation is made towards adapting the decorative part of the elevation to the material and the construction. In general, however, the ordinary architectonic forms, as used in stone and wood, are followed, and the whole painted and sanded in imitation of Connecticut red sandstone, a material now much used in building. The construction of some of these elevations is at once simple and effective, alike for strength as architectural effect, and there appears to be very little difficulty in taking out an old front and substituting a new one, as the whole is well braced together by tyes and screws—the side walls sustaining the structure in all essential points. In Philadelphia there are some admirable examples of this adaptation of cast-iron to architectural purposes, and others were in the course of construction, in which more or less of originality in the matter of design and decoration is attempted. For retail shops of several stories where light is an object, and heavy pieces of masonry tend to lessen the size of the windows, these cast-iron elevations appear to be peculiarly well adapted. The dryness of the atmosphere, however, presents a great advantage, from there being less tendency to oxydization than in a more humid climate. It would appear probable that this use of cast-iron will eventually produce a style of street architecture, as applied to retail shops, of a different character to that which now prevails, and which is in imitation of European modes alike of construction and decoration.

Cast-iron elevations for buildings.

Ornamental castings for architectural purposes, such as balustrades, railings, &c., are produced in large quantities in New York, Boston, Philadelphia, and other large cities, and these are usually copies or adaptations of similar work made in England. A few manufacturers aim at originality of design, with a greater or less degree of success.

Ornamental iron-castings.

At Philadelphia, the garden decorations, ornamental cast-iron work for cemeteries, monuments, &c., manu-

Mr. Robert Wood's foundry, Philadelphia.

factured at the foundry of Mr. Robert Wood, are good examples of their class. One or two verandas and garden fountains were very superior in design to the ordinary run of such things, being well adapted both to the material and the purpose for which they were intended. Mr. Wood was engaged in the production of a cast-iron statue of the late Henry Clay, 15 feet high, to be placed upon a Doric column of the same material, about to be erected by the citizens of Pottsville, Schuylkill county, Pennsylvania,—a work requiring no ordinary amount of skill in moulding, &c.

Garden decorations.

Messrs. Chase, Brothers, and Co., Boston, Massachusetts.

The ornamental and decorative iron castings of various kinds produced at Boston, Massachusetts, may be illustrated by those manufactured by Messrs. Chase, Brothers, and Company, as these are fair types of the best class of work, both as regards execution, skill, and the application of art to the embellishment of the useful, to which this firm has paid more than ordinary attention, and that too with some success, when the difficulties in obtaining good and workable designs are taken into consideration. The iron railings manufactured by them are of a very superior character, both as regards the construction and decorative arrangements of the parts, a few being more severe as regards geometric quantities and architectonic adjuncts than would be considered commercially prudent by many English manufacturers; and the severity of style would in all probability really militate against their sale, where exuberance of ornamentation is considered an essential. Some of the articles of garden furniture and decoration are also good, but, in general, the ultra-natural types, so much used in Europe, are followed in all their absurdity. This is observable too in the umbrella-stands, and hat and coat trees, not only of this house, but of all the others of which time permitted an examination.

Iron railings.

Garden decorations.

Umbrella-stands, hat and coat-trees.

Iron-bedsteads.

The iron bedsteads, manufactured by Messrs. Chase, are fair average examples, and are of a similar kind to those manufactured in England. The peculiar talent of the inventors of the United States does not appear to have been much directed to those useful articles of furniture, in which so wide a field still lies open for an improvement, alike in construction as in decorative adjuncts. Brass is scarcely used as a mounting, and the method of japanning is susceptible of a more than ordinary amount of improvement.

The pernicious system of covering ornamental iron castings with dark green paint, and rubbing the projecting parts with metallic powder, in imitation of bronze, is, of course, as rife in the cast-iron articles of the United States as in those of Birmingham and Sheffield. In toilet mirror-frames, too, made of cast-iron, woods and metals of all kinds are imitated. Occasionally a manufacturer sets himself against these "shams," and insists upon the sensible course of either black-leading or blacking with black bituminous varnish, gilding a moulding or rosette here and there, but never suggesting any other material than that of which the article is really composed.

Toilet mirror frames.

The manufacture of cast-iron mantels for fireplaces, in addition to stoves and grates, is largely carried on in various localities. The mantels produced by the rival Marbleized-iron companies at New York are certainly very remarkable and exceedingly useful articles of their class. These are covered with a preparation of enamel, the report on the application of which, however, belongs to the class of Mineral Manufactures (Class XXVII). The decorative effect of these substitutes for the more costly material of marble is very good. Some of these cast-iron mantels, as produced by the manufacturers of grates and stoves, are merely japanned black, and being carefully got up are admirable in point of workmanship, and the distribution of the material to the points requiring the greatest amount of strength; and, except when elaborate ornamentation is attempted, the designs are pure and architectonic, though perhaps the latter might be objected to as tending to conceal the real nature of the material.

Cast iron mantel-pieces.

It is probable that, after the castings for millwork and machinery, the greatest weight of metal would be found to be consumed in the manufacture of the ordinary stoves used for domestic purposes. These stoves are peculiar in their construction, being chiefly adapted to burn wood as fuel, though many of them will also consume coal. They are at once the warming appa-

American stoves.

ratus and kitchen ranges of the great mass of the people, and the varieties are almost innumerable, any improvement in construction being usually the subject of a patent. The manufacture of these articles may be said to be distributed all over the United States; but there are certain localities in which they form an extensive staple trade.

The New England States and the State of New York may be said to supply their own wants, as also some of the North Western States, and the British provinces. Philadelphia and Baltimore manufacture stoves for the Southern and South Eastern portion of the Union; Pittsburg, Pennsylvania; and Cincinnati, Ohio; supplying the demands of the Western and South Western States. These latter affording a wide field for inter-emigration, the wants of the settlers create a constant demand in the two last-named cities, both of which, from their favourable position as regards the supply of raw material and fuel, together with ready means of transport throughout the whole of the Mississippi and Missouri districts, have the supply of the markets of the West. One house at Pitsburgh now manufactures 10,000 stoves per annum, having given up every other branch of the iron casting trade to devote attention to the production of stoves and tea-kettles only.

It is estimated that at least 20,000 stoves per annum are manufactured in Pittsburg, and 50,000 in Cincinnati.

Designs for stoves.

The patterns or designs of the various houses differ very much. Some of the enterprising obtain designs from, and even have patterns modelled in Europe; and they register, or rather take out a patent right for the design, which can be done apart from the question of construction. Piracy is, of course, complained of, as also invasions of patent rights in construction. Much ingenuity is often displayed in the arrangement of the parts of a stove, and the adaptation of the decoration to strengthen and sustain those portions requiring the greatest amount of metal. Great efforts are made after novelty, alike in construction, ornamentation, and in name; for every stove has a distinct title by which it is known in the market; and the euphony of some of these is often more amusing than appropriate. Except for office stoves and those required for public buildings, European designs are not generally so well adapted to the use of the ordinary article, as the less ornate but more common-sense designs of the Americans. There is, however, a wide field for a better style than as yet prevails; and as an absolute necessity exists for a certain amount of decoration of surface, alike to strengthen the panels, sustain the angles, and hide defects in casting, which would be too apparent on a mere plane surface, the ornamentation adopted often partakes of the character of an excrescence rather than of a decorative adjunct.

Cast-iron stand for a news-room.

Generally the designs of cast-iron articles manufactured at Cincinnati are superior in point of fitness to those of Pittsburg, since the latter are of a more conventional and antiquated character; and it is more than probable that the large number of Germans settled in the former city influence in a large degree the character of its productions in this respect. One of the best and most original productions in cast iron which came under my notice in the United States, was the side of a newspaper-stand in the public reading-room of the Young Men's Mercantile Library Association at Cincinnati. It is constructed of a well-arranged perforated ornament, admirably adapted to the support of a double desk or "lectern," upon which the newspapers are placed for perusal. It was manufactured by Messrs. Horton and Macy, of Cincinnati. The general character of the productions of this firm in stoves, grates, &c., is superior in point of taste to much of the same work done in England, except in very costly articles. Unfortunately no opportunity presented itself for an interview with the principals of this house, owing to the limited period devoted to the manufactures of Cincinnati as compared with the time required to do them full justice; or the number of European, as compared with American workmen in their employ, would have been ascertained.

General character of cast-iron work.

The general character of the cast-iron work of the United States is admirable, alike for the purity of surface in the material, and the skill shown in the moulding. The iron, being in many instances smelted with charcoal, is of a firm quality and closer grain, so to speak, than that used for similar work in England. Hence the castings produced are sharp in detail and even in surface, and require a very small amount of dressing or filing to complete them. The character of the charcoal-made iron is shown in a remarkable degree in the quality of the wrought-iron nails manufactured at Pittsburg. These are exceedingly tough, bend like wire, and are very different from the brittle articles of a similar class usually produced in England. There are 14 or 15 establishments for the manufacture of nails in the above city, producing from 8,000 to 10,000 kegs of 100 lbs. weight each, giving about 1,600 tons of nails per week. The manufacture of bar, hoop, and sheet-iron, and iron-wire, is also carried on in four or five of these manufactories. About 2,500 workmen are employed, and the value of the produce is upwards of $4,000,000, or about £800,000 sterling.

Nails.

Bar, hoop, and sheet iron.

There are about 30 large foundries and many smaller ones at Pittsburg, employing 2,500 operatives, and consuming 20,000 tons of pig iron annually in the manufacture of various castings. The produce of these foundries is estimated at about $2,000,000, or £400,000 sterling.

Foundries at Pittsburg, Pennsylvania.

Tacks of copper, zinc, and iron, hob-nails, and rivets, are also manufactured at Pittsburg by Messrs. Campbell, Chess, and Company. These are produced by machinery, and the articles are well and clearly made, with good points and well-formed heads. All the ordinary sizes are made in iron and copper; but only the larger sizes in zinc, as the friability of this metal appears to be unfavourable to the manufacture of the smaller kind.

Tacks.

The manufacture of locks, latches, door furniture, &c., is also largely carried on at Pittsburg; and the Novelty Works of Messrs. Livingston, Roggen, and Company, and the Excelsior Works of Messrs. Edwards, Morris, and Company, illustrate this department of industry.

Locks, latches, and door furniture.

In the Novelty Works 450 workmen are employed, of these 150 are moulders and casters. The character of the small castings produced in this establishment is excellent, and very little filing is required in the fitting

Novelty works, Pittsburg, Pennsylvania.

of the various parts of the articles together. Locks, latches, and bolts are manufactured in great variety, chiefly of a comparatively cheap kind for the supply of builders in the West. A cheap, simple, and ingenious lock, chiefly for bed-room doors of hotels, is manufactured here. It has two bolts and two keyholes, but there is no connection between them. Thus, the lock cannot be opened except from the side on which it is locked.

Locks, latches, and bolts.

"Janus" lock for hotels.

Scale-beams, platform scales (Fairbank's patent), for counters, railway offices, &c., are also manufactured in large quantities and of good quality.

Scale beams and platform scales.

Paint and coffee mills of various kinds and of a cheap character, the latter being fitted into wooden boxes, form a very important item of business; 450 dozens of coffee mills being made every week.

Paint and coffee-mills.

At the Excelsior Works similar articles are produced, but not to the same extent. About 150 workmen are employed, and the general run of work is the same as at the Novelty Works, except that each has contrivances in locks, latches, and fasteners, peculiar to itself.

Excelsior works, Pittsburg, Pennsylvania.

A lock with a wrought-iron extension spindle, to adapt it to the varied thickness of doors upon which it may have to be fitted, is a clever and useful invention as made at the Excelsior Works. It consists of a perforated plate acting upon angular notches cut into the spindle; the plate being easily screwed at the requisite distance indicated by the thickness of the door upon which the lock has to be fixed.

Extension spindle for locks.

Probably the most extensive, and certainly the best conducted and most systematically arranged establishment for the production of miscellaneous hardware articles in the United States, is that of Messrs. Miles Greenwood and Company, Cincinnati, Ohio. In addition to foundries for large castings common to nearly all establishments of this class, the manufacture of the smaller cast-iron articles is fairly and successfully established, and most of those coming under the denomination of "builders' hardware," which a few years ago were almost entirely supplied from England, are now pro-

Messrs. Greenwood and Company, Cincinnati, Ohio.

Builders' hardware.

duced here in immense quantities, to supply the constantly necessary requirements of the Western States.

Butt hinges.

In the important item of butt hinges there can be no doubt of the great superiority of those manufactured by Messrs. Greenwood, alike as regards the general quality of the metal as in the adaptability of strength or weight of material to size. In the finish of the joints great accuracy is obtained, whilst the labour of filing is saved by grinding the joints of the hinges on stones adapted to the purpose, and driven by steam-power. About $15,000 or $20,000 worth of these butt hinges are produced yearly.

Domestic hardware.

Most of the hardware articles for domestic use, usually manufactured by a large class of the hardware establishments of England, are also made here; and the general finish of the articles is certainly of a superior character, except where more than an ordinary attempt is made at ornamentation, and then the results are by no means satisfactory.

Malleable cast-iron.

Malleable cast iron is also manufactured by Messrs. Greenwood into a great variety of articles usually made of wrought iron. These consist of braces or bit-stocks, screw-wrenches, bed-keys, chest-handles, gun-mountings, saddlers' ironmongery and coachware, kettle-ears, thumb-screws, nuts, &c., and have the reputation of being very excellent substitutes for the more costly wrought-iron articles.*

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* In Cincinnati there are several extensive machine and locomotive establishments. Messrs. Niles and Company, who formerly carried on a large trade in the manufacture of sugar mills, have successfully directed their attention to the construction of locomotives. The application of steam power to fire engines also appears to have been successfully carried out in this city; and as Mr. Whitworth did not visit Cincinnati, it may be useful to insert a description of a trial of the steam fire engine now in use by the authorities there, conducted for my satisfaction by Mr. Greenwood.

On entering the engine-house I found the engine standing in perfect order and readiness, the same as ordinary fire engines in well-conducted establishments in England, two engineers and two drivers being constantly in attendance. The water in the boiler was quite cold, but prepared fuel was laid ready in the furnace. On the signal being given, a light was applied to this fuel and it kindled immediately. Four horses were in the meantime attached to the engine, and it started as it would have done to a fire, followed by a light spring-cart

Works for the smelting and rolling of copper for use in manufactures have been established on the banks of

Sheet copper.

containing wood for fuel. It went a distance of about four hundred yards. In 10 *minutes* from the time at which the fire was lighted there was steam sufficient to pump water for the condensers; and at the end of 13½ *minutes* the water entered the hose. In another *half-minute*, making in all 14 *minutes* from the time at which the signal was given for lighting the fire, the water was in full play, from 2 pipes each 1 *inch* in diameter, fixed at the end of hose, each 200 feet long.

The arrangements of the hose can be varied as required. Thus two jets of an inch each, at the nozzle of the pipe, are supplied by attaching two hose to each side of the engine, and uniting each pair in one hose to feed a pipe each; or these can be again united so that they form but one jet of 1¾ inch in diameter. By another arrangement, in which the full power of the engine is brought to bear, hose can be attached to four screw joints in front of the engine, in addition to the two on each side. These can be formed into *two* streams of 1¾ inch, or *four* of 1 inch each, or into a single jet, the latter being 2 inches in diameter at the nozzle of the pipe, and of immense force. A jet of this volume was thrown over the roof of a five-story house in a clear and distinct stream, which went in a curve, probably 15 feet, above the roof-ridge.

The engine has eight pumps, and is constructed double throughout, so that one side can work independently of the other. All the pumps must get out of repair before the engine is prevented working. The water is pumped from cisterns founded at convenient points in the streets of Cincinnati; but with a receiver of sufficient capacity the ordinary hydrants would answer as well. Its gross weight is about 5 tons, and the cost from \$6000 to \$7000, or from 1200*l.* to 1400*l.* sterling.

Mr. Abel Shawk, of the firm of Latta and Shawk, Buckeye Works, Cincinnati, is the inventor and patentee; and the construction being satisfactorily perfected in the estimation of those who have had the best opportunities of judging and testing its powers, this firm now undertakes to manufacture and supply steam fire-engines to order.

It would be presumptuous to pronounce too distinctly as to the value of this invention if used in the narrow and crowded streets of an European city, or subjected to the wear and tear of a large manufacturing town. The trial above described was, however, most satisfactory. There was no hurry or appearance of special effort, and nothing done except what could have been effected with ease in the midst of the confusion and alarm of a conflagration. The points upon which most stress may be laid in contradistinction to previous attempts, both in the United States and in England, to adapt steam power to fire-engines, are the number of pumps, the perfect double construction, admitting of one side of the engine being worked independently of the other, and the character of the furnace and flue, which admit of and promote quick combustion, the latter being again further assisted by the rapid passage of the machine through the streets on its way to a fire; by which means the steam is got up without loss of time. It was stated too, on good data, that the saving over the cost of the ordinary fire establishments of the United States, taking that of Cincinnati as an average, is at least 80 *per cent.* G. W.

the Monongahela river, near Pittsburg, by Messrs. G. H. Hussey and Company. The ore is from Lake Superior, and is conveyed from thence by way of Cleveland on Lake Erie to Pittsburg. It consists of large solid masses of native copper, cut with a cold chisel, for convenience of transport, into pieces weighing from 3 to 4 cwt., and is often of great thickness. It is also found in "pearls" or washings, of very good quality. The copper, when smelted, is cast into bars and ingots, or rolled into sheets, and in these forms is sent to the various seats of manufacture in the United States. Messrs. Hussey have one furnace constantly employed in reburning the "slagg" of former refinings, from which they obtain 2½ per cent. of copper.

Native copper.

In addition to preparing the copper in sheets and bars, copper tubes for steam boilers and cooking dishes, adapted to the stoves so extensively used for domestic purposes, are also manufactured. The latter being tinned inside after the manner of ordinary hollow-ware, form durable and useful utensils.

Copper tubes for steam boilers. Stamped cooking dishes.

The great abundance of coal in the neighbourhood of Pittsburg gives it great advantages in the smelting of ores, and in those manufactories in which mineral fuel is an essential. Its cost is $1½ (about 6*s.* 6*d.* sterling) per ton.

The rolling of metals into sheets, and drawing into wire, is carried on to a very considerable extent in New England, and silver, copper, brass, and German silver are thus prepared for use in various manufacturing localities in those States. At Waterbury, in the State of Connecticut, which may be said to be the centre of the various manufacturing towns and villages of the valley of the Naugatuck, the final preparation of metals for manufacturing purposes forms an important branch of industry. Connecticut, as a State, is considered as the chief seat of the metal toy and tin-ware trades; and, although the manufacturing villages and establishments are spread at irregular distances along the banks of the Connecticut and in the valleys of the Naugatuck and Housatonic rivers, the aggregate of industry is very considerable, and is largely on the increase from year to year.

Metal rolling and wire drawing.

Waterbury and its trades may be taken as a fair specimen of the manufacturing towns and villages alluded to, and is said to have been the seat of one of the first button manufactories established in the United States. From this has arisen other analagous trades which could be readily carried on in the same establishment, often by the same or similar machinery, or by the same operatives.

Waterbury, Connecticut.

The Scovil Manufacturing Company now carry on the manufacture of metal buttons as fairly established, some forty years ago, by the Messrs. Scovil. The buttons of this house are good examples of the kind of goods in demand in America, and are chiefly manufactured by machines invented and constructed upon the premises. One machine for punching out the blanks for spherical buttons, and raising them to the required convexity in one operation, does its work at the rate of 280 buttons per minute; whilst another machine, fitted with six punches, strikes out 1,800 plain blanks in the same space of time. An ingenious machine is also employed for "milling" the edges of the ordinary plain gilt buttons, and does the work of 10 or 12 girls.

Scovil Manufacturing Company, Waterbury. Buttons.

Punching machine.

Milling machine.

The military buttons manufactured in this establishment, as also the general range of ornamental articles of the same class, are in better taste than the generality of similar goods produced in England. Less effect is aimed at, and extravagant subjects in high relief are avoided; most probably from a want of dexterity in sinking the dies. The results, however, are much more satisfactory than those arising from the misdirected ingenuity which too frequently characterises the ornamentation of the same kind of articles as produced by the English manufacturer.

Military buttons.

Like many other branches of industry, the button trade of the United States has had great difficulties to contend with at the outset, from clashing with certain supposed commercial interests; and even now, unless the American manufacturer can afford to fix a price which will allow a large margin of profit, as compared with European products, the merchant prefers obtaining his supplies from England, France, or Germany.

A beautiful automaton machine for shanking buttons has been lately introduced by the Benedict and Burn-

Automaton shanking machine.

ham Manufacturing Company, Waterbury, and is in operation in their wire-drawing establishment, being the invention of a mechanic in their employ. The blanks being cut in thin brass, are put into a curved feed-pipe, and descend by their own gravity to the level of the machine. Each blank is carried by the machine under a punch which stamps out the centre hole. The shank is made below by another portion of the machine, from a continuous wire carried along horizontally. From this, the wire to make the shank is cut off and bent, being pushed up at the instant the blank, with the centre hole stamped in it, comes in a vertical line therewith. Another punch descends with a hole in the centre, to allow of the doubled wire forming the shank to go into it, and this gives the blank the requisite concavity and forces the brass tightly round the wire, after which another punch, with a wedge-like edge, descends and opens the wire, spreading it within the concavity, and thus the back of the button is completed. The machine does this in the most perfect manner, at the rate of 180 or 200 per minute. All that is required of the attendant is, to feed the tube with blanks, and when one coil of shank-wire is exhausted to supply another. It is impossible to conceive anything more complete in its way than the machine at work at the period of my visit. Two or three others were in the course of construction, and in a more or less complete state.

Florentine buttons.

Florentine buttons and tufts for upholsterers, and covered nail buttons, in silk and Utrecht velvet, are also manufactured at Waterbury.

Daguerreotype plates and mountings.

The extensive use of the daguerreotype in the United States has created a great demand for the plates, metal mountings, or "trimmings," as they are technically called, connected with the cases in which the pictures are fitted. The plates for the pictures are invariably manufactured of British copper, as being more perfectly refined and possessing a more even and sounder fibre than the native copper, therefore better adapted to this purpose, where evenness of surface is indispensable. The Scovil Manufacturing Company, whose productions in buttons have been already quoted, carry on a large trade in the manufacture and supply of these daguerreotype plates, together with the "mats," cases, and hinges for the latter. They also manufacture brass, German silver, and silver-plated hinges for cabinet furniture, pianofortes, &c. These are mostly very plain, or, when ornamented, are simply so in outline; and they are well-finished and tasteful-looking articles of their class.

Cabinet hinges.

The daguerreotype plates are prepared by the rolling process, the silver being plated upon the copper in the course of the operation, and this is afterwards cut into the various sizes required. The "mats," or ornamental mountings, usually fitted into the cases for keeping in the picture, are engraved and chased for the most part by machinery, and by an ingenious adaptation of eccentric movements, the "sight" of the metal frame is corrected to the true circle, oval, or oblong with turned corners, in the same operation by which the chasing is performed.

So successful has this branch of the metal toy trade of Connecticut become, that it is confidently asserted that the German manufacturers, who formerly supplied these articles, are nearly driven out of the markets of the United States.

Candle-sticks and candle lamps.

Candlesticks and candle-lamps also form a portion of the trade of Waterbury, and the Scovil Company are successfully engaged therein; but, from the fact that oil is extensively used for domestic illumination, and the lamps most generally used are of a peculiar and somewhat primitive character, the manufacture of candlesticks or candle-lamps is not likely to become of much importance.

Whilst upon this point, it may be well to remark, that the lamps alluded to, and which supply the place of the common candle in domestic use, are articles of great consumption, and are manufactured in immense quantities, chiefly of tin and pewter, and even of common glass and earthenware. They are of various sizes, and are adapted to one or more wicks, according to the purpose for which they are required. These are almost universally used, except when wax tapers or gas are adopted. Attempts are sometimes made to render them more or less decorative, especially the larger kind, with two or more wicks for table use; those manufactured of glass, either cut or pressed, being the most successful in this respect. From the peculiar construction required, however, there can be little doubt that a pleasingly ornamental article might be produced by the combination of metal tubes and glass,—the former being used as a column, and the latter material manufactured as the oil-holder and base, or the column and base might be manufactured entirely of metal, and the oil-holder alone of glass. At present the article is unnecessarily clumsy and inelegant. It is, however, in its integrity, and has not yet been overlaid or disguised by false or crude ornamentation, in which use has been bidden defiance to for the sake of decorative effect.

Wire drawing.

Wire-drawing is an important branch of industry in many parts of Connecticut, chiefly for the manufacture of pins. The Burnham and Benedict Manufacturing Company, Waterbury, and the Waterbury Brass Company, are both largely engaged in wire-drawing and metal rolling; but the chief manufacture of the latter company is that of brass kettles or pans, of a novel and excellent character and make. Instead of casting them, as is frequently done in England, the article is "spun" up from a flat plate, by powerful machinery, constructed for the purpose. Nor is this process confined to the smaller sizes, since they range from 1 to 20 or 30 gallons and upwards. There is great equality of strength throughout, with a less weight of metal than usual. The brass, from the rolling and spinning processes, is more consolidated and tougher than when cast, and therefore is not so easily fractured; yet the whole is effected without the process of annealing. The vessel is strengthened with an iron wire worked into the rim in the process of manufacture. A most useful, and even elegant-looking, though plain utensil is thus produced at a moderate price, and is especially well suited by its lightness, capacity, and durability, to the purpose of the emigrant to the Western States or to new countries, for which markets it is chiefly manufactured.

Waterbury Brass Company.

Brass pans.

Pins, hooks-and-eyes. American Pin Company, Waterbury, Connecticut.

The manufacture of pins and hooks-and-eyes by machinery is an important feature in the trade of Waterbury, as also of other places in the State of Connecticut. The American Pin Company, whose works are at the above-named place, manufacture these articles largely, turning out 1,200 packs of solid-headed pins per day, each pack containing 255 dozens of pins. The machinery for manufacturing hooks-and-eyes is very complete, and is somewhat similar to that employed for the same purpose at Birmingham. A machine employed in the American Pin Company's Works for "papering" the pins is most ingenious, and accomplishes the object with great certainty and rapidity. By a regulation of the company, strangers are not allowed to see the pin-making machines.

The American Pin Company contribute specimens of their manufacture, both in pins and hooks-and-eyes, to the Exhibition at New York.

Stamped brass.

In stamped brass some progress has been made in several parts of the States. The Waterbury Hook-and-Eye Company, besides manufacturing the articles thus indicated by their title, have just commenced the manufacture of stamped brass articles, such as window cornices, curtain bands, &c., for the establishment of which trade German operatives have been engaged; but the results could not be fairly judged of, as these workmen had only recently commenced operations. In this branch of the metal trades, however, the Burnham and Benedict Company contribute some admirable specimens to the New York Exhibition, as also excellent examples of rolled brass in large plates.

Rolled brass.

Automaton machine for making ladies' hair-pins.

The manufacture of ladies' hair-pins by automatic machinery has just been commenced by Messrs. Blake and Johnson, manufacturers of case-hardened steel rollers and machines for the use of working jewellers, Waterbury. This machine is of their own invention and construction, and is remarkably effective. A quantity of wire is coiled upon a drum or cylinder, and turns round upon its axis as suspended from the ceiling of the workshop. The point of the wire being inserted into the machine, and the power applied, the wire is cut off to the requisite length, carried forward, and bent to the proper angle, and then pointed with the necessary blunt points, and finally dropped into a receiver, quite finished all but lacquering or japanning. The pins are thus made at the rate of 180 per minute, and the machine goes on without any immediate superintendence being required until the whole coil of wire is exhausted.

Ornamental brass-work.

The manufacture of ornamental brasswork, as applied to the purposes of lighting, forms a progressive and important branch of industry in several large cities, but more especially in Philadelphia. In the establishments of Messrs. Cornelius, Baker, and Company, and Messrs. Archer and Warner, of that city, as also in that of Messrs. H. N. Hooper and Company, of Boston, Massachusetts, the rapid progress made of late years in the manufacture of ornamental gas-fittings and table lamps, &c., is fully exemplified.

Brass castings for chandeliers and gas-brackets.

The chief portion of the work is cast, little or no ornamental stamping being attempted. It is scarcely possible, however, to conceive better work than the generality of these ornamental brass castings. At Philadelphia especially, the greatest attention has been paid to this point; and a peculiar advantage is derived here from the fact that the sand obtained in the vicinity of that place is of so fine a character as to require no sifting for use, and the finest castings are easily made, so far at least as material goes. The pattern is simply modelled in wax, and from this a brass pattern is cast direct, no white metal being used. The brass pattern is carefully and thoroughly chased, and from this all future work is produced. Thus, the shrinkage and variation of size between the white metal pattern and the brass casting, often found to exist in castings made from the former, is avoided. The brass pattern, too, takes a sharper and more decisive chasing than white metal; and, as the castings are never chased, as from the fineness of the sand they are sufficiently sharp and effective without it, the accuracy of the pattern is of the first importance, and all that is required to be done after the castings leave the foundry, is to file off the very small amount of superfluous metal retained in the casting, and fit the parts together.

Spinning from flat metal plates.

The bodies of chandeliers, whether vases or dishes, are invariably spun up from the flat metal plate, instead of being stamped, as is usually the case in England. This is the old method of producing these portions of lamps and similar articles, and appears to have been introduced into practice in America by German workmen. It is not confined to small bodies; but is used for the production of larger sizes than are usually considered practicable. Very large bodies, however, are generally hammered up.

Circular shears for cutting sheet metal.

Discs of plate metal, for the purpose of spinning up, are cut by a machine with two wheels, having the sharp edges working against each other, after the manner of a pair of shears. Those circular cutters work with great ease and rapidity, giving great facilities to the workman, and presenting an elegant method of doing laborious work with the greatest possible ease and certainty.

Annealing spunwork.

The first form from the plane is a simple truncated cone, the second process of spinning, after annealing, giving the requisite curves to the sides. In annealing the spun-work, after the first process of raising from the flat plate, it was formerly found that the metal cracked, more particularly in the bottom angle. To prevent this cracking during the annealing process, it has been found that the simple bending or squeezing in of the sides of the cone, until the circle becomes a somewhat elongated ellipse, and then placing a quantity within each other, has the desired effect, and cracking rarely if ever takes place. This is stated on the authority of Mr. Cornelius,* of the firm of Messrs. Cornelius, Baker, and Company, by whom it has been successfully adopted in practice.

Messrs. Cornelius, Baker, and Company, Philadelphia.

In this establishment, consisting, as it does, of three distinct factories, one for casting and soldering, another for machine-work, and a third for filing and fitting, 700 workmen are employed. Commenced about 30 years ago, it has gone on increasing its sphere of action to the present time, a constant attention to the scientific principles of metallurgy and mechanism having tended to its prosperity from the beginning; when, in the establishment of a business, at that period, so novel in its character, and so doubtful as an enterprise, it was more than probable that everything, except traditionary modes of action, would be rather repudiated than encouraged. In point of economy, however, science has been found to be the cheapest as well as the best assistant, as indeed it ever will be when combined with a thorough knowledge of the work to be done by its aid.

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* If any additional proof was required as to the value of accurate scientific knowledge as applied to a manufacture in which mechanical invention and great skill in chemistry and metallurgy is so essential to complete success, it will be found in the fact that the gentleman above-named received an education specially adapted to the requirements of the business which his father, the late Mr. Cornelius, was about to establish in Philadelphia; and that his studies in abstract science and the various discoveries and expedients, both mechanical and chemical, as resulting therefrom, have given the house, of which he is now the head, an immense advantage over both foreign and domestic competitors. The system, order, and accuracy which prevail throughout this establishment are full evidence of the influence of a mind reaching as far beyond the ordinary traditions of the workshop and foundry, in a scientific sense, as in the practical result it goes beyond the mere dilettantism of speculative science *sans* application. G. W.

Value of science as applied to manufactures.

Brass dipping.

In the dipping process, as pursued in these works, great modifications are made in the character and strength of the acids used. It was found that from the variation of temperature at Philadelphia, ranging, as it does, from below zero in the winter to 96° and 98° in the shade in the summer, nitric acid became unmanageable during the hot season, as its fumes were given off so rapidly as to injure the health of the workmen. The accurate scientific knowledge, however, brought to bear upon this point,—one, too, involving the very existence of the trade, except at a frightful destruction to human health and life,—has obviated every difficulty, adapted the acids to the temperature, and the dipping department is comparatively free from noxious fumes, even under the highest of the above temperatures. On the day (June 20th) on which I visited the works, the thermometer stood at 98° in the shade.

The result is equally satisfactory as regards the colour of the work when dipped, some novel effects being produced, and a singular purity of colour obtained.

Lacquering.

In lacquering, considerable improvements have also been made. It was found that the lacquers made after the English formula lost colour very quickly, from the extremes of temperature already noted; and that during the months of July and August, when the due point of the barometer is reached in Philadelphia, the red lacquered work always streaked in the direction of the marks of the spinning-tool on the broad surface of metal. After a series of experiments, carried through several months, Mr. Cornelius succeeded in making a lacquer, which he states to be quite permanent under any variation of temperature.

The usual methods of decorating burnished surfaces by varnish pencillings and dippings, for coloured effects, are adopted here, as in Europe. The lacquering is all done by men, no females being employed.

Table lamp columns.

The columns of table lamps are made of sheet metal formed into tubing, and fluted upon a mandril, by means of a wheel acting in the direction of the axis. This is said to have been adopted by Messrs. Cornelius, Baker, and Company before it was attempted in England, and they were enabled by these means to go into the market with a great advantage in price over the cast column lamps imported from Europe, as the cost of that portion of each article was two-thirds less in Philadelphia than in Birmingham.

Lard lamps.

The manufacture of lamps for the consumption of lard still forms a considerable item of trade, especially for the Western markets; but these are not so much in demand as formerly, owing to the more extensive use of gas. At least 150 patents have been taken out, from time to time, in the United States for contrivances for effecting the consumption of lard for the purposes of lighting. The lard lamp manufactured by this firm, however, appears to have been one of the most successful; the principle of the candle being kept in view, and the heat applied in the direction of the point of illumination.

Gas fittings.

Great attention is paid both by Messrs. Cornelius, Baker, and Company, as also Messrs. Archer and Warner, to the perfect accuracy of all their gas-fittings. The gas-works of the city of Philadelphia are celebrated for the perfection to which the manufacture of gas is carried, and the thorough scientific principles upon which every detail of the establishment is carried out, not the least important of which is the uniform gauge of all fittings; so that any part becoming defective is at once repaired without trouble, and, of course, at a less expense than when a constant variation in the gauge of the fittings is permitted.

Gas-burners.

At Messrs. Cornelius, Baker, and Company's manufactory, the sawing of the slit of the gas-burner is executed with the greatest accuracy, and, although not done with such rapidity as by the process usually adopted in England, the greatest exactitude is obtained as to the quantity of gas the burner is capacitated to consume; and whenever a new saw is substituted for an old one, the slit is carefully tested as to its capacity for consumption, by means of a gas-meter placed by the side of the workman. In short, guessing is avoided in everything connected with this establishment.

Fitting of gas pipes.

In the fitting of the pipes the same accuracy and care is manifested. The screw is turned in a lathe, to prevent the possibility of splitting the pipe, which is more or less invariably done by the ordinary screw-plate; but the crack, being very minute, is not discovered until after having been some time in use, when the gas begins to escape, and continues until a permanent leakage is established.

Composition for gas-pipe joints.

In order to secure the joints completely, a composition of wax, resin, and venetian red is applied to the tap, which is sufficiently hot to melt it; the pipe is then screwed in, and the joint is at once sounder and cleaner than when cemented by the application of white lead, the usual material employed for this purpose in England.

Amongst the workmen employed by Messrs. Cornelius, Baker, and Company, are eight or nine Englishmen,[*] the rest being Germans, French, and Americans; but the majority are undoubtedly native workmen.

Messrs. Archer and Warner, Philadelphia.

Messrs. Archer and Warner employ about 225 workmen, and are engaged in precisely the same trade as Messrs. Cornelius, Baker, and Company. The remarks as to the character of the work produced by the last-named firm, especially gas-fittings, and the perfect division of labour, which is not so general a feature in American as in European manufactories, applies with equal force to both establishments; and though that of Messrs. Archer and Warner is not so extensive, its operations are carried on in a systematic and efficient manner, the results being shown in the articles produced, which are excellent of their class. The designs are adapted to the markets to be supplied, and as these are generally of a third or fourth rate character, according to the English standard, a redundance of ornament, rather than purity of style, is the chief point aimed at.

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[*] One of the modellers and designers employed in this manufactory at the date of my visit, was a student of the Birmingham School of Design at the period I quitted my duties there, *pro tem.*, to proceed to the United States on the business of this Commission.

Another modeller from Birmingham had been so employed for some years.—G. W.

Chandeliers, &c.

In no instance can the chandeliers, gaseliers, or lamps manufactured in the United States be said to come into competition with the better class of productions as manufactured in Birmingham. The demand for the larger kinds being chiefly for use in hotels, public saloons, &c., a showy and attractive article, at a comparatively cheap rate, is that most in demand; and though some of the details of those produced for these purposes are admirably modelled, there is often a great lack of that congruity in the parts by which a perfect *ensemble* can alone be realised.

The smaller articles, for domestic use, are often more effective and far more tasteful than the more ambitious examples, less ornamentation being aimed at; for, as lightness in weight of metal, and cheapness in cost, are the chief points, redundancy in decoration is not possible. At the same time as a certain amount of effect is essential, and this is attained by a repetition of the same details in varied forms of application, the chains used in the cheaper kinds of chandelier are formed of links, which, though very ornamental and effective, are scarcely touched by the file, being sufficiently accurate, when put together, to answer the purpose of effect, and give the appearance of a large amount of work where very little really exists.

Girandoles.

A peculiar kind of girandole, chiefly purchased by the artizan class as a chimney ornament, is largely manufactured. The base and vertical support is of brass with glass prisms, and often with two branches for candles. The choice of subject for the vertical portion is often ludicrously inappropriate, yet the sale of these things is said to be immense, from their showy character and low price.

Comparing the prices of the low-priced articles, it may be calculated that an English chandelier which would cost $18 (say £3 3*s.* sterling), is very fairly imitated, or more correctly speaking, its place in the market is supplied by the American manufacturer at $11½ (about £2 3*s.* sterling).

Brass work for ships.

The manufacture of decorative brass-work for ships, steam-vessels, &c., is largely carried on by Messrs. H. N. Hooper and Company, Boston, Massachusetts, in addition to the manufacture of chandeliers. The cast work is generally in good taste, and there is more artistic breadth of effect in the ornamental portion of the articles manufactured by Messrs. Hooper than in those produced at Philadelphia; the latter being florid and showy, whilst the former are more massive and simple.

Messrs. H. N. Hooper and Co., Boston, Massachusetts.

Spun work is even more largely used than in the manufactories at Philadelphia, and the skill and dexterity of the workmen in this department is very great.

Stamped parabolic reflectors.

Parabolic reflectors, for ships' lamps, are manufactured by Messrs. Hooper by a stamping process. These reflectors are generally of a much larger size than usually attempted by this process; but it is effected with complete success, both as regards accuracy of form and lowness of price, as compared with hammered work.

Bells.

Bells of an excellent character are also cast in this foundry. It may be remarked, however, that the most extensive bell-foundry in the United States is that of Messrs. Meneley, Troy, State of New York.

Ornamental brass work in the Exhibition at New York.

The contributions in ornamental brass and bronze work to the Exhibition at New York are generally good, the most extensive display being made by Messrs. Cornelius, Baker, and Company, Philadelphia, and the remarks already made as to the character of their productions apply to their contributions to the Exhibition, as those fully bear out the opinions expressed as to the general excellence of the work, and its adaptation to the markets it is intended to supply.*

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* A prize medal was awarded to this firm by the jury (Class XXII) of the Great Exhibition of 1851, for chandeliers.

Ornamental bronzes.

In ornamental bronzes, the specimens of native manufacture are so mingled with those of European production, as to prevent a proper estimate of the position of this branch of industry. There are, however, two or three establishments in New York, the proprietors of which employ French and German workmen in the production of many articles of mere ornament or exceptional use, but which can scarcely be considered as coming under the denomination of works of art in metal.

Lamps.

In lamps there are numerous contrivances for the consumption of oil, lard, camphine, &c. These are all more or less of a decorative character, but do not call for special notice after the remarks already made as to the manufacture of these articles.

Brass joints for gas and steam tubing.

The specimens of brass joints for gas and steam tubing, manufactured by Mr. Samuel Griffiths, New York, and contributed to the Exhibition, are sufficient proof of the admirable manner in which those useful articles are manufactured.

Locks.

In locks the contributions are pretty extensive; but want of time and the difficulty in obtaining access to the goods, from the lack of authorised attendants, and the unarranged state of some portions of this department, prevented that close examination into details which was requisite in order to form an accurate opinion. The general finish of the articles, however, appeared to be good.

Iron safes.

Iron safes for banks, counting-houses, &c., are manufactured to a large extent by many hardware houses. These are as varied in construction as the many contrivances of a similar kind for the safe custody of cash and books are in England, and are the subjects of as many patents as the authorities at Washington can be induced to grant.* The workmanship of nearly all the safes exhibited at New York is of a very excellent character, and the style and finish generally tasteful and appropriate.

Hollow ware.

In hollow-ware, Messrs. Cresson and Company, of Philadelphia, to whose foundry other more pressing calls prevented a visit, exhibit various culinary and household articles of a good and useful character, the produce of their manufactory.

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* By the patent laws of the United States, the Commissioner of Patents decides whether or not any contrivance or invention is a fit subject for an exclusive right.

Tin-ware.

The specimens of tin-ware show a good character of work, and, as already stated, this branch of the hardware trade is largely carried on in various parts of the State of Connecticut, whence most of the examples exhibited at New York come. A useful and well-made series of machines and tools for the use of tin-plate works, manufactured by Messrs. Roys and Wilcox, Mattabesset Works, East Berlin, Connecticut, and exhibited by them, show several novel contrivances for economising labour in the manufacture of this ware.

Gimlet screws.

Gimlet screws, in which the point of the screw supersedes the use of a gimlet in making the requisite hole, are largely manufactured by the New England Screw Company, and now extensively used in the United States; and the variety of sizes exhibited at New York show the applicability of this simple but useful contrivance to be more extended than is generally supposed.

Carriage springs.

Carriage springs would appear to form an important item of manufacture, and the examples shown at the Exhibition at New York are of good make and finish.

Miscellaneous hardware.

Miscellaneous hardware, chiefly of Connecticut manufacture, articles of wire-work, bed-springs, and sundry contrivances more or less useful and ingenious, show the extent to which the manufacture of all kinds of articles in every-day use is now carried on in the United States; and that whilst the fitness, strength, and proper construction is carefully attended to, there is no lack of executive skill in substantial objects of utility.

Manufactures in Britannia metal will be reported upon with those departments of industry coming under the head "Works in Gold and Silver, and their imitations," as these usually form a branch of those establishments in which gold, silver, and electro-plated wares are carried on.

Cast-iron fittings of the library of the Congress, Washington.

As the application of cast iron to architectural purposes has been already alluded to, more especially in its application to external construction and decoration, it may be desirable to notice here, that in the Library of the Congress of the United States, now in the course of construction in the Capitol, at Washington, the whole of the interior fittings are of iron. The piers supporting the book-shelves, and the balustrade of the gallery, which is carried all round the room, are of this material, cast in ornamental forms, with medallions, also in iron, of Washington, Franklin, and other eminent American statesmen. These latter are in high relief, and are most admirably modelled and cast. The book-shelves are also plates of iron; and whilst the whole is thus rendered fireproof, it is also highly ornamental.

CLASS XXIII.

WORKS IN PRECIOUS METALS, AND THEIR IMITATIONS—JEWELLERY, AND OTHER PERSONAL ORNAMENTS.

Works in gold and silver.

A love of display, which is certainly one of the characteristics of the people of the United States, affords ample encouragement to those branches of industry in which gold, silver, and precious stones are employed; and, as a matter of course, the imitations of works of this class are equally in demand amongst those whose means will not permit of an indulgence in the more genuine articles. At present this tendency towards the more luxurious forms in which the decorative arts are employed is undirected, so far as the great mass of the people is concerned, by any principles of taste, and is, therefore, completely at the mercy of the unreasoning judgment of the manufacturer, whether domestic or foreign, who caters to what he supposes to be the prevailing taste of his customers. The American manufacturer, however, is in some respects wiser than his foreign competitor, and in many instances leaves the ultra-ornate to be supplied from Birmingham and Sheffield, and directs his energies to the development of a better and less exuberant style, which he finds is demanded by the more refined amongst his countrymen. Thus works are occasionally produced which would not discredit any European house. Still the manufacturer has to consider the demands of the market, and, as far as possible, regulate the character of his staple productions thereto; and, as this market gets its tone in a large measure from the abominations which the European manufacturer chooses to believe are best suited to the wants and wishes of his Transatlantic customers, the American producer has to follow the lead thus given. The shopkeeper, however, is perhaps more to be blamed than any other person. He assumes that his customers want an enormous display of unmeaning decoration, and therefore orders little else from the manufacturers. The public have, consequently, little choice; and constantly seeing ugliness and exuberance in ornamentation, its taste and judgment becomes vitiated and depraved, and the simplicity and fitness of pure forms appear tame rather than beautiful. A chaste style of decoration, therefore, appears to be plainness itself amidst the glittering nonsense usually presented for inspection. Thus the incessant effort to meet suppositititious demands on the part of the public results in creating the very want of taste and judgment complained of in the abstract, but practically catered to and encouraged. The more enlightened of the manufacturers of the United States, however, are strongly impressed with the conviction, that they and their customers of the shopkeeping class are the real instructors or vitiators of the taste of the people; and though at present borne down by the style and character of the goods most in demand, as arising from the causes above named, yet with an educated people they believe that this cannot last for any great length of time. It would be well, therefore, for those foreign manufacturers who supply these articles to the American markets to consider how far a purer taste will affect the demand for their productions, as the time may quickly come when the doctrine "that anything will do, so that there is enough of it," will no longer be true of the kind of goods it is now their province to supply so largely.

Public taste.

The growth of a purer taste in the United States.

It has been thought desirable to make these remarks preliminary to reporting upon the present state of the class of industry under consideration, as there exists, in England at least, very erroneous views as to the present and growing tastes of the people of the United States. For whatever the past might have been, or the present may be, the future is likely to be very different. The daily increasing intercourse with Europe is pregnant with great changes. Persons of even moderate means now make a point of visiting, not only England, but those continental States in which the arts have flourished for ages, to search out and carry back with them new ideas of art, and of correct principles as applied thereto, which their education and the eminently practical turn of their minds will not allow to slumber on their return home. Looking with contempt upon those articles of luxury which formerly pleased a merely puerile taste, these individuals influence their countrymen more largely than may be thought possible, since the educated intelligence of the latter renders them equally alive to the value of sound principles; and a few excellent examples in the way of illustration have an influence, and convey an amount of instruction, which the uneducated could never feel or understand. English manufacturers have it especially in their power to either assist in the formation of a purer taste in the American people, or, by neglecting their growing judgment, to oppose and retard, but not crush it. By assisting its development they are likely to secure to themselves, or, at least, share very largely in a market for a long time almost entirely their own, but which is gradually being occupied by their Transatlantic competitors. By neglecting the progress of a more enlightened and purer taste, they will as inevitably lose it altogether.

Manufacture of gold and silver plate.

The manufacture of gold and silver plate is more or less carried on in nearly all the larger cities, especially New York, Boston, and Philadelphia. In the last named it partakes of the character of a settled trade, there being some twelve or fourteen establishments in which a considerable number of persons are employed, and the productions of which are of a varied, but for the most part of a useful as well as an ornamental character. Table services, and all the articles of utility comprised in suites of plate for domestic use, form the staple articles; and these are manufactured in large quantities.

Characteristics of workmanship.

The workmanship is usually sound, but it often happens that on close examination a deficiency in that nicety of finish, especially in the chasing, which characterises the best English work, is observable. Still it is rarely found that the equally, or perhaps more objectionable practice of over-chasing, to the destruction of the artistic effect of the details, is committed. The fault is evidently that of timidity of handling; but there is a wisdom in leaving off at the right time, which the elaborate chasings of English works rarely display.

Effects of primary education.

In most of the manufactories a few European workmen are to be found; but the Americans engaged in this department of industry are usually of a superior class, and it is remarkable how soon they get into the system of those amongst whom they are thrown as mere learners. In this as in other branches of industry, their minds being thoroughly prepared by education, they seem to seize upon and master even very difficult points in manipulation and construction, as it were by mere instinct. It is, however, more than probable that this rapidity of conception is unfavourable to that perfect and complete execution which is often characteristic of the more plodding and painstaking workman; and on the whole there is, as already stated, less finish than is to be found in kindred works as produced in England. This opinion applies to the general run of productions in the class under consideration, whether in gold and silver, or the less costly, but often equally meritorious productions in German silver, electro-plated wares, and Britannia metal. At Philadelphia, Messrs. Bailey and Company produce excellent articles in silver, many of which are in good taste. The gold filagree and pearl work manufactured in this establishment is, when the French taste is not followed, both superior in design and workmanship. There is, however, in these trinkets, as in other things, too great a tendency to follow the mere conceits of the European works of the same kind, such as close imitations of natural forms, &c., rather than rely upon the good sense which suggests constructions adapted to the nature of the material used. When this is done, it is almost invariably with success.

Messrs. Bailey and Company, Philadelphia.

Filagree and pearl work.

Messrs. Conrad, Bard, and Son, Philadelphia.

Messrs. Conrad, Bard, and Son, also of Philadelphia, manufacture gold and silver plate, but a considerable trade is carried on by them in the manufacture of spoons and forks. For this purpose they use a machine invented and manufactured upon their own premises, by which the production of these articles is very much facilitated.* Two circular dies or rollers are sunk with forms of the articles to be rolled out. These are usually spoons of two sizes, a fork, and the side of a knife-handle. As the intaglio of one die is accurately adjusted to, and agrees with that of the other, one forming the *obverse* and the other the *reverse* of the pattern, both sides of the article are perfected at once, and the rollers accomplish the work of a stamp press in a much more effective and economical manner. The rollers are about 5 inches in diameter, and are of course manufactured of the best steel and case-hardened. Being set to the thickness of the articles required, and that of the sheet metal from which they are to be made, the perfect passage of the pieces through the rollers is secured by a series of notches sunk in the margin of each figure upon the die, the impression of these being in the superfluous metal surrounding the work when delivered from the machine. This has to be cut off, and is effected by a circular saw, the prongs of the forks being cut in a similar manner. It is an ingenious and useful invention as applied to light articles in silver, taking up a small amount of space in a workshop and doing a much larger amount of work than a stamp press.

Machine for the manufacture of spoons and forks.

The Ames Manufacturing Company, Chicopee, Massachusetts, are largely engaged in the manufacture of silver and electro-plated wares, and the castings in that branch of their establishment were of a very excellent character. Attention is chiefly confined here to

The Ames Manufacturing Company, Chicopee, Massachusetts.

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* A similar machine to this is said to be in operation at Paris. The principle is the same as that invented by Krupp, the exclusive right to use which, in England, has been secured by Messrs. Elkington, Mason, and Company, of Birmingham, and now so successfully worked by them for the manufacture of spoons and forks. The machine of Messrs. Conrad, Bard, and Son, is suitable only to very thin work; and for the want of a self-acting guide, as applied to Krupp's machine, the work is liable to come out in a curve instead of a right line, and the amount of scrap metal and dust arising from the margin surrounding the article, as delivered from the machine, must be a serious drawback to its profitable use as compared with the more perfect machine in use at Birmingham. G. W.

Electro-plated wares.

articles most constantly in demand; castor-frames, dish-covers, breakfast and tea services, and the most decided requisites of table suites, being the staple. There was much taste and great excellence of workmanship in some of the examples. In others, the usual mistakes in following European patterns were visible.

Bronze statues. Brass cannon.

This extensive manufactory is curious from the great variety of articles and the multiplicity of operations carried on. Brass cannon are cast with great success, and a colossal statue of De Witt Clinton, as also a work of some excellence, the Angel of the Resurrection, both by Mr. H. K. Brown, the sculptor, the latter being a contribution to the Exhibition at New York, have been lately produced, and in a manner highly creditable to the skill of all parties concerned. This is a novel branch of the metallic arts in the United States, and one requiring no small amount of technical knowledge to get through with success.

The artistic castings in iron produced here are equal to anything by the best houses in Europe, and is abundantly proved by the medallions in alto-relievo of Washington, Franklin, and other eminent men, executed for the library of the Congress in the Capitol at Washington, as a portion of the decorations of the interior fittings, which, as stated before, are entirely of iron.

Swords.

Swords also form an important branch of manufacture by the Ames Company, the blades, hilts, and scabbards being all produced upon the premises. There is also a manufactory of turbine wheels, cotton machinery, planing machines and lathes.

A few English workmen are employed and one or two Germans as modellers; the rest of the workmen are all Americans.

Messrs. R. Gleason and Company, Dorchester, Massachusetts.

At Dorchester, Massachusetts, Messrs. R. Gleason and Company manufacture plated wares of fair average quality, employing about 100 workmen. These are white metal with electro-plated surface. Some of the castors made here are very tasteful and original, and the forms of some of the tea and breakfast sets are also good. The dish-covers are mostly after English models. The general style of the article, as also the workmanship, especially as regards strength and durability, is highly to be commended, considering the influence of the ordinary demands of the market for the light, cheap, and showy; but there is certainly a lack of perfect finish in the details.

Britannia metal wares.

The Britannia wares of this house are also good.

Lamps in brass form a department of Messrs. Gleason's trade. Die-work is chiefly used here, with some spun-work in those portions of the articles to which it is most applicable,

Messrs. Reid and Barton, Taunton, Massachusetts.

Messrs. Reid and Barton, Taunton, Massachusetts, produce Britannia metal goods on a considerable scale, it being the chief branch of their trade. The electro-plated articles of this house, however, are of excellent character.

In Britannia metal originality of design is aimed at, and with some degree of success; but they copy any successful patterns from Europe, more especially those produced at Sheffield.

They employ about 100 persons, but only one Englishman. The remarks already made as to the lack of accuracy in finish applies to Messrs. Reid and Barton's productions, yet the effect of the work is generally good, and their contributions to the New York Exhibition are at once highly creditable and pleasing specimens of a useful class of articles.

The contributions in this class displayed in the Exhibition at New York are varied in character, but presenting certain points of excellence, and the ordinary over-ornamented articles are the exception.

Works in gold and silver in the Exhibition at New York.

Messrs. Bell, Black, and Company, of New York, as also Messrs. Tiffany, Young, and Ellis, of the same city, besides being extensive importers of European plate, are also manufacturers, and their contributions are of a good character. A tea service of California gold, with a *plateau* of silver, is remarkable for the elegance of the smaller pieces and the general excellence of the workmanship, and amongst the variety of articles exhibited by this house are some of elegant and tasteful form and ornamentation. The engraved work, too, is good, and of better design than usual. Two ewers exhibited by Messrs. Tiffany are also of good form and excellent in decoration, and a dinner service also contributed by them is neat and elegant, being the very reverse of the usual mode.

Messrs. Jones, Ball, and Company, Boston, Massachusetts, exhibit a very satisfactory series of the ordinary articles insilver for domestic use.

Forks and spoons of good make are contributed by Messrs. Rogers, Brothers, Hartford, Connecticut.

The exhibits in Britannia metal goods are of a useful character; the "turned" ware, manufactured at Troy, New York, by Mr. John H. Whitlock, being chiefly noticeable for their simplicity and utility; those of Messrs. Hattersly and Dickenson, of Newark, New Jersey, being more ornate, but of good forms.

Jewellery.

The contributions in jewellery do not call for any special remarks; but the manufacture of gilt toys, and imitations of gold and silver ornaments for personal decoration, forms a very considerable item in the industrial productions of some parts of New England.

Waterbury Jewellery Company, Waterbury, Connecticut.

At Waterbury, Connecticut, the Waterbury Jewellery Company manufacture the ordinary gilt articles set with coloured glass and artificial stones. The designs are more like the Paris productions of the same class than those of Birmingham, but both French and English articles are imitated, and the work is of average quality. Machinery is extensively used in this manufacture, and with success as regards the result as seen in the quality of the work.

Attleborough, Massachusetts.

Attleborough, Massachusetts, is the chief seat of the gilt toy and jewellery trade of the United States, but an intended visit was obliged to be abandoned for want of time.

In 1850 there were nineteen establishments for the manufacture of jewellery, employing 381 operatives, the value of the articles produced annually being $ 478,200, or about £95,500 sterling. In this place the first manufactory of gilt buttons, as also the first manufactory of gold and gilt jewellery and silver ware, were established in the United States.

The manufacture of bronzes, &c., so far as at present carried on, has been alluded to in Class XXII.

CLASS XXIV.

GLASS MANUFACTURES.

Glass.

The glass manufactures of the United States are fairly established, and there can be no doubt of the present healthy position and future progress of this branch of industry. With superior materials in abundance, and skilled labour increasing with the development of the trade in which it is employed, the progress from the earlier productions, in which articles of common use were the staple, to those rich and decorative works which belong to luxury rather than to utility, has been steady and continuous; and though from the position of the people the more useful articles are those to which the manufacturer directs most attention, yet there is a laudable spirit abroad which compels him to attend to those branches of his trade wherein his European rival and instructor excels in the artistic elements of production.

Pressed glass.

It must be remembered, too, that the method of manufacturing glass by means of metal moulds, in imitation of cutting, now generally known as "pressed glass," is an American invention, and was first introduced into England in 1834, by Messrs. Richardson of Stourbridge.

Chief seats of the glass manufacture.

Pittsburg, Pennsylvannia; Boston, Massachusetts; and Jersey city, New Jersey; are respectively seats of the glass trade, although there are many manufactories spread over different portions of the Federal Union, especially in the New England States.

Window glass.

Pittsburg is chiefly the seat of the glass trade for the supply of the South and West, and its productions are confined exclusively to the more useful articles for domestic use, of which there are eight establishments, employing 500 operatives, and the manufacture of window glass, of which there are eleven establishments, employing about 600 hands, and seven furnaces for the manufacture of phials. Cylinder glass, of a common character, is the chief make in window glass; and with materials in abundance either close at hand, or within the range of the water carriage on the Ohio, Alleghany, or Monongahela rivers, which unite at Pittsburg as a centre, every facility exists for the prosecutoin of the glass manufacture to an enormous extent. Coal, too, is cheap and in great abundance.

Fort Pitt Glass-Works, Pittsburg, Pennsylvania.

The Fort Pitt Glass Works are now carried on by Messrs. Curling, Robertson, and Company. The managing partner is a native of Birmingham, but has been at Pittsburg many years. His father was a working glass-maker, who emigrated in 1812 as a gardener, to evade the laws then in force against the emigration of skilled mechanics, &c. About 100 workmen are employed here, and there are three furnaces of five pots each. The make is mostly in pressed glass, and all the more useful articles are manufactured; these being of good form and clear colour. The peculiar wants of the consumer are consulted, and the goods are sent to all parts of the United States. The chief markets are those of the South and West.

All the materials are prepared on the premises. Missouri sand is used for the finer articles, and Alleghany sandstone, when found free from iron, is used for the commoner purposes, after being pounded and burnt. These materials are obtained in great abundance in Pittsburg.

Messrs. Bakewell, Pears, and Co., Pittsburg, Pennsylvania.

Messrs. Bakewell, Pears, and Company carry on a similar trade, and produce an excellent assortment of useful goods which are entirely of pressed work. The average price of tumbler glasses is 2*s.* per dozen.

Pressed glass decanters.

Pressed glass decanters are manufactured by both the above named firms very successfully. These are considered as novelties in American manufacture. They are generally first made as tumblers, and then worked up in the neck, &c., afterwards. The result is a cheap presentable article, very much in demand.

A new design for a "pressed" decanter just completed by Messrs. Curling, Robertson, and Company, appeared, from its form, to have been made by the "plunger" going in at the bottom, thus making the body and neck at the first operation, the bottom being closed afterwards.

The metal moulds for the manufacture of pressed glass are made upon the premises of each manufacturer;

and as the production of novelty is a point aimed at by each, as an important element of success, the getting up of new designs demands a considerable amount of care and attention.

Boston and Sandwich Glass Company, Sandwich, Massachusetts.

The Boston and Sandwich Glass Company, Sandwich, Massachusetts, have an extensive establishment in which a good style of work is carefully carried out. There are four furnaces of ten pots each; the make of glass is about 60 tons per week, and 500 persons are employed. The general run of useful articles in cut and pressed glass are made by this firm. The forms are generally tasteful and well adapted to the material and mode of manufacture, especially in pressed glass, of which very large examples are produced. Costly cut articles, however, are not manufactured.

The Boston and Sandwich Glass Company make large quantities of the lamps peculiar to the country, already described in Class XXII. as being used instead of candlesticks. The exceedingly low price at which these articles are sold creates a great demand for them, as the glass offers facilities for cleaning which no other material presents, the oil being so easily wiped off the surface; whilst a decorative effect is produced at a cheap rate by the adaptation of the forms to the pressed methods of manufacture.

New England Glass Company, East Cambridge, Boston, Massachusetts.

Probably the most complete establishment in the United States for the manufacture of all kinds of glass-ware is that of the New England Glass Company, East Cambridge, Boston, Massachusetts.

This is an extensive concern, conducted with admirable system, the productions comprising every kind of flint and ornamental cut and coloured glass, many of the specimens of the latter approaching the Bohemian standard in quality of colour and gilding. A lightness of form, too, has been obtained in some articles which indicate considerable skill and accuracy in manufacture and finish.

About 550 operatives are employed. There are two 12-pot and three 10-pot furnaces, of from 1,500 to 1,800 lbs. of metal each.

Sand and lead.

The silex used is a sand of beautiful quality, the produce of Berkshire county, Massachusetts. The company manufacture their own minium, the material in pig lead being brought from the State of Missouri, in which lead-ore has been of late years worked to a considerable extent.

The glass when manufactured is very clear and pure in colour, the pressed work being remarkably smooth, even, and free from *stria.* The designs and forms are generally well adapted to the material and mode of production. Amongst the large examples, a centrepiece of a tazza form, with the patera or dish from 2 feet to 2 feet 6 inches in diameter, and the stem and base in proportion, afforded abundant evidence of the extent to which this branch of the business has been carried, and the facility with which large articles are now produced by the pressed method

Cut glass.

The cut glass showed care and skill; the bottles are generally of excellent form and make, clean in the neck, and not over-ornamented with cutting. A satisfactory result, too, is obtained in some articles by the combination of cutting and pressing. The smaller details are pressed, and the larger and broader parts cut.

Opal glass.

The opal glass manufactured at this establishment is better than the great portion of that produced in Europe. It is clear in body and pure in colour. Bone is used instead of arsenic for the finer qualities. For common articles the latter material is employed as usual.

Gilding on glass.

Gilding is executed very successfully, and it is stated that other houses in the United States have attempted to gild their own work and have failed, this being the only establishment in which it is now carried on.

Imitations of Bohemian glass.

Venetian paper weights.

The imitations of Bohemian glass are good, and some of the designs are of a superior character, whilst others are of the usual inadaptive types, and are over-ornamented. The Venetian paper weights manufactured here are very excellent examples of their class.

Silvered glass.

Articles in glass, silvered and engraved by Kidd's process, are extensively manufactured, and are in great demand in the United States from their effective and showy appearance.

Chemical glass.

The New England Glass Company have paid a large share of attention to the production of a good quality of glass for chemical and philosophical purposes; and this now forms another important branch of business.

Glass exhibited at New York.

The contributions of this firm to the Exhibition at New York sustain its well-earned reputation. A complete service, pressed, in a neat diamond pattern, and another of cut glass, are very elegant in character, and beautiful in workmanship.

The other contributions in glass do not call for special remark.

Time did not permit of an inspection of the several glass works established in Jersey city, and Brooklyn, Long Island, both opposite to New York city, some of which have a reputation for producing good articles of their respective kinds.

CLASS XXV.

PORCELAIN, AND OTHER CERAMIC MANUFACTURES.

Porcelain.

The manufacture of porcelain is quite in its infancy in the States, but there can be little doubt that its progress will be, at no distant period, both rapid and effective, as materials in abundance are to be found in many portions of the vast territory of the Union. When the value and properties of these materials are more thoroughly understood than at present, by those most interested, it would be contrary to the genius of the people of the United States if efforts are not made to realize every advantage which their working can give.

Queen's Ware Pottery Works, Pittsburg, Pennsylvania.

At the Queen's Ware Pottery Works, Birmingham, Pittsburg, Pennsylvania, a ware similar to that known in England as "queen's ware" is manufactured. The forms of some of the vessels are good, and the syrup jugs, mounted with Britannia metal, articles much used in the Western States, are very fair specimens of their kind. All the attempts at decoration were in relief only, and though a blue (cobalt) glaze is used, still the colour of the clay makes the result anything but satisfactory. The oxyde of cobalt, by which this blue glaze is produced, is manufactured in large quantities by Messrs. Coffin, Hay, and Company, Philadelphia, who export it to Europe. The ore is found in

Oxyde of cobalt.

Missouri and Delaware porcelain clay.

great quantities near both the Missouri and Mississippi rivers. The fine clay of the State of Missouri is obtainable in great abundance, and that, with the porcelain clays of the State of Delaware, is said to have been already exported in small quantities, at least, to England.

An experimental specimen of the former clay, tried with a blue glaze, was very pure in colour and clear in the fracture.

The proprietor of the Queen's Ware Pottery Works is an Englishman named Bennett, and it is a subject of some regret to report that he was the only person throughout the whole of this inquiry who refused to myself the information asked for. Personal and merely private questions were always carefully avoided, as calculated to prove embarrassing to those who, in a spirit of candour and liberality, were willing to furnish all needful information on public grounds only. Mr. Bennett, however, declined to give any information as to the progress and present position of the trade in which he has been successfully engaged for some years past. It is a source of infinite satisfaction that a course at once so puerile and so obnoxious to common sense was taken by a foreigner rather than by a native of the United States, and that an intelligent American gentleman, deeply interested in the porcelain trade, did all in his power to compensate for the absurd course pursued by Mr. Bennett, who, in endeavouring to keep secret the resources and power of a country to whose hospitality and encouragement he owes his present position, simply excited a greater amount of curiosity and inquiry.

Earthenware made at Liverpool, near Pittsburg.

The manufacture of the common kind of earthenware is established and carried on at Liverpool, at some distance from Pittsburg, on the Ohio river. Here there are several manufactories, but want of time did not permit of a visit. The chief markets for the produce of these potteries are found in the Southern and Western States, and from the information in which subsequent inquiries resulted, it would appear that Pittsburg and Liverpool are likely to become the great seats of the porcelain and earthenware manufacture, from the fact that fuel is cheap, materials of various kinds abundant, whilst the demand must be constantly on the increase as the Western States become more populated. It is scarcely possible, therefore, to imagine a wider field for enterprise and skilled labour than is here presented, or one in which there would be a greater certainty of ultimate success.

Fenton's patent flint enamelled ware.

Messrs. O. A. Gager and Company, Bennington, in the State of Vermont, manufacture a ware known as "Fenton's patent flint enamelled ware." This is produced from a very white clay found near Charleston, South Carolina, and the beds of which this firm has secured the right of working for twenty-one years. It takes a beautiful glaze, and presents a remarkably clear and transparent appearance. It is chiefly used in the manufacture of the mottled-brown ware, but presents a white fracture, as the mottled surface is simply in the glaze. Of this kind of ware, even at the present rate of production, $1,500 worth per week is manufactured, for which a ready market is found. This ware is got up in imitation of a much commoner article usually manufactured of yellow clay. The present trade however, appears to be merely a beginning, and a large development, both in the kind and quality of production, may be easily foreseen; as the facilities are great, and an enormous demand awaits a corresponding supply.

Earthenware bleach rings.

The useful article of bleaching-rings is manufactured of this porcelain clay, and finished with the brown glaze. These are largely used by bleachers, dyers, and calico printers, for running pieces of cloth through from one part of the dye or bleach-house to another in the various processes. They are preferable to the glass rings usually employed, as they are less expensive, and are not so liable to break under the expansion and contraction of the iron stays in which they are fixed for use. The demand for this article alone is greater than the manufactory can at present supply.

Parian ware.

A parian ware, of good colour and surface, is also manufactured by this firm, from materials obtained near the manufactory, in the State of Vermont. It is composed of the flint, quartz, felspar, and clay obtained from the Green Mountain district and the adjacent rivers. This ware is unglazed, and will not stand the test of hot water. It presents, however, a valuable and useful material for a large class of ceramic productions not as yet manufactured in the United States, especially the more ornamental articles for which parian is so largely used in England.

Porcelain exhibited at New York.

In the Exhibition at New York is a very full exposition of the various kinds of articles and wares manufactured by this house.

Messrs. Haughwout and Dailey, New York city.

In the higher branches of the porcelain trade, the productions of Messrs. Haughwout and Dailey, New York, take a fair position, though the articles contributed by them to the New York Exhibition are by no means equal to the best examples shown in their own establishment. Without being manufacturers of porcelain, they employ about 100 persons, male and female, in the decorations of the various articles they import in the *bisque* state. Many of the workmen are Englishmen, the females being chiefly employed in the gilding and burnishing.

Porcelain flower-vases, &c.

The articles consist of the usual stock pieces, such as flower-vases, dessert and toilet services, decorated with landscapes, figures, fruits, flowers, &c., and profusely gilded. These are equal, sometimes superior, to the average productions of the same class made and decorated in Europe. Exuberantly ornate, they are supposed to be adapted to the market, according to the prevailing idea of the requirements of the purchaser, as already alluded to in the consideration of the influence of a supposititious public taste in design in works in gold and silver. The worst feature, however, is, that here, as in Europe, if the purchaser's taste is above the average of that which the manufacturer or shopkeeper fixes as his standard, the intended customer must come down to the latter, or give up his intention to purchase, since the less ornamental, but really more tasteful article is not to be had. The shopkeeper, believing that a redundancy of decoration is the thing most in demand, and which he thinks best, has not provided for those whose taste may be in advance of his own, and, worse still, discourages any attempt in the manufacturer or the workman to produce something better, because, in his opinion, it will not *sell.*

Sign letters and door furniture in porcelain.

There are some useful porcelain articles, such as sign letters and door furniture, amongst the few exhibits of this class contributed to the Exhibition at New York, in which there is both elegance of design and skill in execution, both of painting and gilding.

Earthenware knobs for common locks.

One branch of the ceramic manufacture, as connected with door furniture, is peculiar to the United States, and this is the very extensive use of earthenware knobs for the fittings of common locks. These are usually made of a striated mixture of yellow and red clay, and finished with a strong brown glaze. Arrangements are made in the moulding for the insertion of the spindle, and they are exceedingly useful and serviceable articles. In testing the strength of one of these knobs, it required a very heavy blow to fracture it. They are extensively made at Pittsburg and Liverpool, Pennsylvania, as large quantities are consumed in the former place by the miscellaneous hardware houses, in fitting locks and latches.

CLASS XXVI.

DECORATIVE FURNITURE, UPHOLSTERY, &C.

Furniture.

The manufacture of furniture is carried on to a great extent in nearly all the large cities and towns of the United States. In the former, extensive establishments exist for the production of decorative furniture, the constructive portions being for the most part prepared by machinery,* by which labour is greatly economised, as well as perfect accuracy of fit in the same article of furniture.

Furniture in the New York Exhibition.

No department of industry is more largely represented in the New York Exhibition than that of furniture. This may arise from the fact that there is a large number of manufactories in New York itself, thus affording facilities for the better display of this class of productions.

At Cincinnati, Philadelphia, and Boston, there are also a number of very extensive establishments. In the former city, German workmen are largely employed, and the carvers, generally, are either Frenchmen or Germans, with a few Englishmen.

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* See Mr. Whitworth's Report.

Carving in wood.

Elaborate carving is the rule rather than the exception, and this is fully borne out by the examples shown in the Exhibition, the best of which are evidently the work of Europeans, and the designs partake more of French and German than of English characteristics.

The American woods are not so much used as might be expected, walnut and oak being those which are generally selected.

Owing to the imperfect state of the arrangements, one contribution of furniture, said to be of very novel construction, could not be examined. In the space of an ordinary sideboard, it was stated that a bedstead and complete chamber suite was contained. As it was locked up, and no key to be found, its merits were unascertained, nor could any one connected with the Exhibition state who it belonged to, or where it came from.

The ordinary class of useful and cheap furniture, so largely manufactured for the Western States, was not represented in the Exhibition. This is to be regretted, as much ingenuity and economy of material is often shown in the production of this class of goods.

Papier mâché.

In papier mâché, the productions are all below mediocrity, being chiefly imitations of the worst style of pearl inlaying and japan work executed in England. Everything approaching to purity of design, or in the inlaid work, to geometric arrangement of the parts, is as carefully avoided as it generally is in Europe.

Wall papers.

Paper-hangings are manufactured to a large extent, and are printed both by block and by cylinder. They are chiefly, however, of the cheaper kind and of the usual character as regards design. The better class of papers approach the English and French papers in the character, though not in the elaboration of the workmanship. Messrs. Perkins and Smith, New Bedford, Massachusetts, contribute some good specimens in dining, drawing, and bed room papers. They are all blockwork, and are as clear and as artistic as the style of design would permit.

A peculiar article in paper-hangings is largely manufactured for the Western States. This is about 35 inches wide, and is known as "curtain paper." An ornament, within a panel, is printed, extending to the length of about 1½ yard, and these are cut off and used as substitutes for roller blinds by a large class of people in the West.

Curtain papers.

Painted wall-decorations are evidently growing in public favour, and the extent to which this style of ornamentation is carried in some of the hotels and saloons of the larger cities is calculated, if directed by a purer taste, to do much for art in its higher forms. Unfortunately the upholsterer, rather than the artist, is the director, and the arabesque or pictoral panel is consequently a very secondary matter as compared with the hangings, the carving and gilding, and the carpet. In New York, several of the public buildings are very fairly decorated, mostly by French or Italian artists. The Metropolitan Hall, an admirable room, used for public meetings, concerts, and lectures, is effectively decorated, in the Italian style, with panels, arabesques, and a coffered ceiling, the general tone of the whole being pleasing and satisfactory. The lighting of the room by gas is admirably and tastefully arranged by running a series of gas-burners along the cornice of the gallery, these corresponding with the decorative members. The result is an equal diffusion of light all round the sides of the room, the centre being illuminated by a chandelier.

Painted wall decorations.

Decorations of the Metropolitan Hall, New York.

Carving and gilding, as applied to mirrors, pictures, and window cornices, is another important item of industry in this class, and in point of excellence of workmanship, is on a par with the usual English productions. The style of ornament, however, is at once exuberant and heavy.

Carving and gilding.

On the whole, the decorative arts as applied to furniture are vitiated for any present influence on public taste, by an overwhelming tendency to display; fostered to a large extent by a class of persons whose object it is to crowd as large an amount of work into as small an amount of space as possible, and who prefer charging for labour rather than skill and taste. This reacts on the public mind, and habituates it to redundancy and

Public taste in furniture.

over-ornamentation rather than to purity and simplicity, resulting in the really beautiful.

COPYRIGHT OF DESIGNS.

Copyright of designs.

The law for the protection of copyright in designs forms part of the patent laws of the United States, and the office for granting copyrights, or rather patents, forms a department of the Patent Office at Washington, with a special officer to attend to applications of this class. The protection is granted for configuration and arrangement of the ornaments. None but citizens of the United States are entitled to the privileges, which are granted after due examination as to originality, &c., for seven years; or half the time granted in a patent for invention, &c. The fee paid is one-half the patent fee, or $15 (say £3 5*s.* sterling) instead of $30, but no portion of this is returned if the patent or copyright is not granted, or the patent is withdrawn, as is the case with regard to full patents, two-thirds of the fee being returned in the case of either the rejection or withdrawal of a claim for a patent.

Forms for obtaining a copyright of a design.

The forms are precisely the same as for obtaining a patent for an invention, &c. A petition, specification, and an affidavit or declaration on oath as to originality, must be filed, and a specimen or such essential portions of the pattern as may be needful to show the peculiarities of design, together with duplicate drawings, must be deposited at the Patent Office.

With regard to the kind of articles, the designs of which are usually patented, stoves and metal castings are by far the greatest number. In textile fabrics, very few are protected. Indeed, with the exception of the first-named articles, it is difficult to suppose that much originality in design could be legally claimed. In 1852 there were 126 applications for patents for designs, and of these 106 were granted and 20 were rejected.

In the majority of cases, copyright of design can only be valuable to the manufacturer so far as it enables him to secure to himself, by a rapid process, the exclusive immediate use of his invention. This is especially the case in textile fabrics; and the system of examination, with the delay in the decision, as practised in the United States, would be fatal to the value of one-half the designs registered in England.

ART EDUCATION.

Art-education as applied to manufactures.

The question of art-education, as applied to manufactures, is beginning to claim serious attention in the United States, and though at present taking a totally different direction to that in which it has been the chief object of the more practical minds in England to direct it for the education of the artizan and the creation of a class of art-workmen, it is not the less significant that American manufactures have reached that point at which it has become desirable that originality of thought should be infused into them by means of the designer, if not by the agency of well-instructed workmen. The latter, however, follows the former, as inevitably as effect follows cause; for the design once obtained, the very effort to realise it educates the workman in a greater or less degree in the process.

School of design for females, Philadelphia.

So far as institutions for the special purpose of teaching art in its application to industry have been at present carried, they are intended, with the exception of that attached to the Maryland Institution, Baltimore, for the instruction of females only. The first was established about four years ago at Philadelphia, chiefly through the efforts of Mrs. Peter, the lady of the late British Consul to the State of Pennsylvania. Having visited several of the schools of design in England, and kindred institutions on the continent of Europe, Mrs. Peter conceived that many well-educated females, the vicissitudes of whose families often compelled them to seek employment as a means of obtaining a livelihood, might, if properly instructed, render themselves useful in many departments of design as applied to manufactures, especially in the various kinds of textile fabrics, both printed, woven, and embroidered, as also in paper-hangings and hand-made lace. The result of her efforts was the establishment of a School of Design, partly supported by the contributions of herself and friends, and partly by the fees of the students, which were wisely graduated according to their means and the object for which they studied. Considerable difficulty, however, was experienced in carrying it forward for want of funds to fairly establish it at the outset, and as a permanent support, although it never appears to have lacked pupils; and after a period the committee of the Franklin Institute were induced to undertake the management of the school at Mrs. Peter's request, as she removed after the death of her husband, the late William Peter, Esq., to her native city, Cincinnati, Ohio. The accidental death of Mrs. Anne Hill, the principal of the school, whose talents and earnest devotion to her duties had given a position to the school which promised well for the future, again produced a change, and now the school is divided into two parts; those students who following one of the male teachers constitute a somewhat private establishment, and those who remain attached to the more public institution as originally founded. Each, however, is seeking assistance from the funds of the State of Pennsylvania, or to obtain a charter of incorporation and subscriptions to the formation of an endowment fund, as it has been found that current subscriptions and fees would not support the Institution. In consequence of the division above alluded to, and the embarrassed state of its funds, the connection of the original school with the Franklin Institute was dissolved, a committee of gentlemen taking the property and assuming the debts. It is now proposed to raise an endowment fund of $50,000 dollars (about £10,000 sterling), and thus provide means for carrying on the school by charter, as the fund properly invested would realize a satisfactory permanent income. Towards this object upwards of $17,000 had been subscribed in June last.

The business of the school is carried on in a large well-arranged house, situated at the side of one of the beautiful squares for which Philadelphia is so famous, which, laid out as walks and now filled with well-grown trees, afford in themselves lessons in art to the thoughtful student of design. This school formerly numbered seventy-four students, but there were only twenty-three on the books at the period of my visit in June. The classes, however, are usually indifferently filled during the summer months, and it is a rule for nearly all the scholastic institutions of the United States to take their long vacation during the hot months of the year. The rival establishment, conducted by a former male teacher, is known as the "Institute for the instruction of Young Ladies in Design," as contra-distinguished from the "Philadelphia School of Design for Women," and numbered 32 students. The fees to the latter school are $2 (about 9*s.* 6*d.* sterling) per quarter for those whose situation in life will not allow them to pay more, and $4 for those who can afford to pay that sum. The students who cannot afford the higher fee are certified by subscribers, in fact are nominees at *half-fee.* Ladies, whose means are ample, pay $10, $15, $20, or $24, that is from, £2 to £4 15*s.* per quarter, according to what they learn; and these graduated scales appear well adapted to an institution in which the student may enter any class, provided the fees of that class are paid, without reference, judging from the works, as to the amount of preliminary training in the elements of art. This, however, may be considered as the natural result of so large a dependence upon the fees of the students, as the teachers are rather in the position of private teachers of drawing, than the officers of a public institution; and therefore the choice of the student has more influence on the character of the instruction than sound principles, which, carried out quite independent of the likings or dislikings of the recipient of the instruction, must ever be the great value of a well-endowed public school, conducted on an exact plan of progressive education.

Rate of Students' fees to the Philadelphia School of Design.

Drawing class, Franklin Institute, Philadelphia.

In connection with the Franklin Institute,* Philadelphia, is a drawing class for mechanical and architectural drawing, in which from 60 to 70 students receive instruction during the winter, on three evenings per week for 24 weeks, commencing on the first Tuesday in October in each year. The fee is $5 (about £1 1*s.* sterling) per quarter, or say £2 5*s.* for the session. No free hand-drawing is taught.

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* The character of this Institute stands deservedly high, as under the title of the "Franklin Institute of the State of Pennsylvania for the Promotion of the Mechanic Arts," it has promoted secondary education in an efficient manner, by instruction in chemistry and mechanics, lectures, a permanent museum of models, minerals, and geological specimens, an admirable library, to which no light literature is admitted, even as a gift, and a reading room. Formerly, three

The Franklin Institute first commenced, in 1824, those annual exhibitions of manufactures which have since become so popular throughout the United States, and which have exercised so beneficial an influence in promoting and encouraging the early efforts of American manufacturers by premiums, and the public recognition of the benefits conferred upon the community at large by isolated industrial efforts.

The success of the School of Design for Women, at Philadelphia, under the late principal, Mrs. Hill, and the managementof Mrs. Peter, appears to have suggested the foundation of similar institutions at New York and Boston. The New York School has only been established within the year, and the vacation prevented any inspection of its classes. The promised information as to sources of revenue, rate of fees, number of students, &c., has not been furnished; but it would appear that, from its recent formation upon the same plans as those of Philadelphia and Boston, the facts connected with its working would be of less importance than those of the last-named city, which, though more recently founded,

School of Design, New York.

courses of lectures were delivered every session by three permanently appointed professors, in chemistry, mechanics, and technicology; but now there are two courses of ten lectures each during twenty weeks, a different subject being taken each night of the week: thus, during the early part of the session 1852–53 the subjects were arranged as follows: Mondays, on Botany; Tuesdays, on Astronomy; Wednesdays, on Mining Geology; Thursdays, on the influence of heat, air, and water on Natural Phenomena; Fridays, on Chemistry, as applied to the arts. Thus, a continuous course of oral and experimental instruction is kept up throughout the session, the pupils of the drawing class under twenty-one years of age being admitted free to the lectures.

The Institute also publishes a monthly journal, devoted to the promotion of the mechanic arts. This is the oldest periodical in the United States devoted to this subject, and was commenced in 1826, two years after the first annual exhibition of manufactures. Each number contains 72 pages octavo, at a yearly subscription price of $5.

G. W.

seems to be upon a more permanent footing than that of Philadelphia.

The New England School of Design for Women.

"The New England School of Design for Women" was opened in October, 1851, under the superintendence of an Englishman, a former student of the Birmingham School of Design.* The rooms were adapted to the accommodation of 70 students, and this appears to have been the average number in attendance during the greater part of the time the school has been established. The objects of the school, as stated in the prospectus, are:—"1. To educate a body of professed designers, capable of furnishing original designs for manufactures, and other purposes where ornamental designs are required.—2. To teach the various processes of engraving, lithography, and other methods of transferring and multiplying designs.—3. To educate a class of teachers in drawing and design."

Rate of students' fees to the Boston School of Design.

As the school is intended for a standard or normal school, students are not admitted under fifteen years of age. The fees are $5 (about £1 1*s*. sterling) per quarter. The class hours are from 9 a.m. to 2 p.m. every week day except Saturday, and "the school is open during all working hours for students in special departments, and for the industrial classes."

Programme of instruction.

The programme of instruction, without being very precise, is based upon the general terms of those of the English schools. All students are to go through an elementary course, after which they are to study their own speciality. On this elementary course hangs the whole question of absolute success, or that partial success only which carries on an institution like this for a time, but lays no solid foundation for future progress in itself or in its students. By the annual report for the year ending 30th September, 1852, it appears that the manufacturers of New England are alive to the importance of educating even a class of female designers (the question of art-workmen being as yet untouched); have supported the school with their subscriptions; and, better still, have given employment to those whose progress had been such as to enable them to be useful in designing or drafting for manufactures, as in the case of the two female students employed by the Lowell Manufacturing Company, quoted in Class XIX. Several pupils had learnt to draw on stone, and others to engrave and draw on wood. Several of the examples in the school were very creditable in manipulation, but entirely devoid of that sound artistic basis, always to be discovered, when existing, in the slightest work; and the want of which can never be concealed in the most elaborate production.

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* Mr. W. J. Whittaker, an intelligent schoolmaster, who, feeling the importance of drawing as a part of ordinary education, devoted a portion of his time to the acquirement of a knowledge of outline drawing. His artistic education, however, does not appear to have been carried beyond a fair power to copy "Dyce's Outlines." Prior to leaving England he had, in connection with Mr. Hermann Krüsi, of the Home and Colonial Normal Schools, published a small work on "Inventive Drawing on the principles of Pestalozzi," the method indicated in which he had pursued in the school of which he was the teacher in Birmingham, and which he also followed in the United States when teaching drawing. He was no longer master of the above Institution at the date of my visit, but had commenced a private school of art in Boston, which gave evidence of care and attention to the wants of his pupils. This is now abandoned, and he is devoting his attention to the establishment of similar schools in other towns in the State of Massachusetts. Thus the New England School is the only school of the kind in Boston. G. W.

Instruction in botany.

Lectures are delivered on botany, and a female teacher is specially engaged in giving instruction in this science to all the pupils.

Privileges of subscribers.

The fees paid by the students have been already stated above, but a subscription of $20 per annum gives the subscriber the privilege of nominating one student *free*. Ladies subscribing $3 per annum in support of the institution are enabled to vote at the annual meeting in the election of the committee, &c., but have no privilege beyond that. The expenses have hitherto exceeded the annual income, being $3,500, the proceeds amounting only to $2,700,—$1,500 in subscription and $1,200 in students' fees. The House of Representatives of the State of Massachusetts has therefore recently sanctioned a grant of $1,500 (about £300 sterling) per annum, for three years, in support of the school, as an experiment, thus giving it the advantage of State sanction, and raising its income to the amount which its present wants demand.

State grant in aid of the Boston School of Design.

Character of the instruction.

The general character of the instruction given, both in the school at Philadelphia and Boston, has relation more to pattern-making for manufactures, and teaching drawing as an amusement or accomplishment, than inculcating and enforcing the steady pursuit of the arts of design in their highest forms, whether as applied to manufactures or otherwise. Still, enough has been done to show that, with teachers more efficiently trained to the precise purpose for which the schools are founded, with such examples around as would tend to elevate the minds of the students to the purer forms of classic, and the severer science of mediæval and oriental art, alike in form, colour, and proportion, a progress of a very extraordinary character would be the result. The rapid progress made by the students of these schools is another evidence of the influence of the primary education which it is the good fortune of the children, male and female, of the United States to receive. As in the manufactories the youths enter with minds prepared by sound instruction to grapple with the technical difficulties of their future trades, so in these schools young girls commence their study of art with an amount of useful knowledge eminently calculated to open their minds to the influence of the instruction imparted.

Influence of primary education.

The radical defect of the schools, however, is that which could be easily remedied—the want of a really useful and practical series of ornamental casts, and a severe course of elementary outline examples. The constant use of the former would train the eye both of teacher and pupil to the appreciation of a higher and better style of art than the comparatively mean casts of the ordinary builders' and decorators' ornaments hung about the class rooms; whilst study in a more precise elementary course would give the requisite power to appreciate fully the great principles of design, which a correct analysis of the examples could not fail to give. Pattern-making would become in reality pattern-designing, and artistic principles and practice prevail, where manipulation without power, and efforts without meaning, are now the only result.

Defects of the School of Design.

The School of Design, forming part of the "Maryland Institute, for the promotion of the Mechanic Arts,"

School of Design, Maryland Institute, Baltimore.

at Baltimore, approaches much nearer in its character to the standard and objects of such schools in Europe, and is under the management of an Englishman, Mr. Minifie.*

The school was opened in 1851, and then consisted of three departments—the Primary, in which elementary free-hand drawing, &c., was taught; the Architectural, in which the principles in construction and the styles of various periods were studied; and an Engineering Class, in which the drawing of machinery, mathematics, and the general principles and rules of calculation, as applied to mechanical engineering, formed the subjects of instruction. This plan appears to have been changed since Mr. Minifie undertook the direction, and the school now forms one department divided into six classes:—1st, an Elementary Class; 2nd, a Geometrical Class; 3rd, a Mechanical Class; 4th, an Architectural Class; 5th, an Engineering Class; and 6th, an Artistic Class; the titles of which will sufficiently indicate the studies pursued in each.

Classification.

On the plan of the classes being first made public, about 1,000 persons registered their names to attend; of these 800 applied for seats at the opening of the school; ultimately 400 students attended, and were divided into the six classes, each meeting one evening per week, from 50 to 70 students being the attendance in each class, instructed by a teacher and assistant teacher, and occasionally by the professor, whose attendance is not continuous. A staff of fourteen teachers was engaged in the work of the school last session. No charge is made to members and junior members of the Institute, but a small fee is about to be imposed.

The period of the year prevented the inspection of the classes in operation, as they are only carried on during the winter, as in the Franklin Institute at Philadelphia. The results of the instruction during the session of 1852-3, the second of the operations of the school, and the first under the arrangement last indicated, as shown in the drawings of the students displayed in the Institute, were very creditable.

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* Mr. Minifie is the author of "A Text-Book of Geometrical Drawing for the use of Mechanics and Schools," a work of repute both in the United States, where it was first published, and in England.

The school, thus incorporated with the Maryland Institute, appears calculated to be of great service to the artizan class of the city of Baltimore, and if the system of instruction, as laid down, be carefully and steadily carried out, results of no ordinary character may be fairly predicted, more especially if better examples and models in ornamental art be obtained for the purposes of study, as the standard of art in this department is almost universally very low in the United States, because it is based upon modern adaptations of antique details, often so utterly transformed in their use as to be scarcely recognizable.

Drawing class, Girard College, Philadelphia. Model drawing.

The study of drawing in the public schools of the various States is exceptional, and no settled system exists. In the Girard College at Philadelphia, drawing is taught from models of geometrical solids; but the early progress of the students is retarded by the fact, that not being first taught to draw lines and simple forms projected upon a plane surface, and to be copied as an exercise for the hand and the eye in the apprehension of real form, they work in great uncertainty, and only attain proficiency, even in the delineation of lines, after a lengthened period. This is the experience resulting from all attempts to begin with models only; the power to draw the lines by which the forms of those models are to be represented being still wanting.

Drawing class, High School, Philadelphia.

The drawing class of the High School of the city of Philadelphia is conducted upon the system laid down by a former professor, Mr. Rembrandt Peale, whose excellent little work on "Graphics" is the text-book of the class.* Unfortunately, the operations of the class were suspended prior to the general examination of the pupils, therefore it could not be seen at work. Formerly the more elementary studies were pursued in the Primary and Grammar Schools of Pennsylvania, as well as the High Schools; but the instruction is now almost entirely confined to the latter,—most probably from a want of teachers sufficiently well trained in drawing to act as instructors.

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* Three copies of this work, presented by the publishers, Messrs. E. C. and J. Biddle, Philadelphia, are transmitted with this Report.

Conclusion. Having thus considered the respective departments of industry coming within the range of the various classes committed to my charge to examine and report upon, it may be desirable to call attention to several peculiarities requisite to be understood, as affecting the demand for certain productions, in order to judge fairly of the aims of those whose object it is to supply the wants of their countrymen in those particulars.

Standard of quality in manufactures. In textile fabrics the consideration of that sterling quality in make, which always forms so important an element in the judgment of the European consumer, is comparatively unattended to by the Americans. If the article looks well, and is of such a quality as to stand ordinary wear and use for a period, varying, of course, with the views of the buyer, even a slight advance in the price for a better quality of equal appearance only, will scarcely be obtained by the dealer. The material being expected to last for a single season, is purchased of a quality to do that and no more. The next season the customer supplies himself again.

In furnishing fabrics, such as damasks, carpets, &c., the same principle prevails. A change is desired at the end of two or three years; carpets and furnishing draperies are purchased of such a quality as to look well for that period, and then others of a different style are brought in to supply their places. And this habit of almost constant change is said to run through every class of society, and has, of course, a great influence upon the character of goods generally in demand, which, although by no means devoid of those intrinsic qualities which are the essentials of good manufacture, yet are made more for appearance, and less for actual wear and use, than similar goods are in England.

Decorative art. The development in the department of ornamental manufactures, both in textile fabrics and in metals, as also in furniture and decoration generally, has been alluded to under their respective heads, as also under that of art-education. There is no appearance of any attempt to strike out a national style, although the many peculiar features of the country, the habits of the people, and undoubted originality in the mechanic arts, would lead to the inference that a gradual repudiation of European modes and forms will take place; and that in art, as applied to the utilities of life, true principles in the education of the people in this respect are alone needed to produce results of a very satisfactory character. At present the co-mingling of totally different styles of decoration in architecture, and the adoption of European designs for totally different purposes to those for which they were originally intended, are amongst the least of the errors committed in a vague seeking after novelty.

Art education.

In reporting upon the state of art-education, so far as it has been carried, the great object has been to call the attention of the Americans themselves to the defects of existing efforts, in a friendly but earnest spirit. The future success of the schools of design, as already established in the United States, is likely to be seriously retarded by the absence of good examples suited to the wants of the student, and calculated to carry the instruction in the right direction; inasmuch as the working out of a true system of art-education depends so largely on a proper attention to this point.

That the taste of the people is rapidly advancing with the increased facilities of communication with Europe, and the higher aims to which education is tending, must be evident to every observer. The works in gold and silver, the character of the higher class of furniture, and the silks imported from France and used in the houses of the more wealthy classes, the love of pictures and articles of *vertu*, all show that an almost Oriental love of splendour is rapidly taking the place of those simpler habits and tastes which characterised the severer tendencies of the earlier European inhabitants of the North American Continent and their immediate descendants. With building materials of an unequalled character, the granite and freestone of New England, the marbles of Pennsylvania, and the bricks of Baltimore, give facilities for architectural display, which is gradually developing itself, alike constructively and ornamentally.

Compulsory laws on education.

The compulsory educational clauses adopted in the laws of most of the States, and especially those of New England, by which some three months of every year must be spent at school by the young factory operative under 14 or 15 years of age, secures every child from the cupidity of the parent, or the neglect of the manufacturer; since to profit by the child's labour during *three-fourths* of the year, he or she must be regularly in attendance in some public or private school conducted by some authorised teacher during the other fourth.*

This lays the foundation for that wide-spread intelligence which prevails amongst the factory operatives of the United States, and though at first sight the manufacturer may appear to be restricted in the free use of the labour offered to him, the system re-acts to the permanent advantage of both employer and employed.

The skill of hand which comes of experience is, notwithstanding present defects, rapidly following the perceptive power so keenly awakened by early intellectual training. Quickly learning from the skilful European artizans thrown amongst them by emigration, or imported as instructors, with minds, as already stated, prepared by sound practical education, the Americans have laid the foundation of a wide-spread system of manufacturing operations, the influence of which cannot be calculated upon, and are daily improving upon the lessons obtained from their older and more experienced compeers of Europe.

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* The following are the clauses in the laws of the commonwealth of Massachusetts as affecting the education of children employed in manufactories.

"No child under the age of fifteen years shall be employed in any manufacturing establishment, unless such child shall have attended some public or private day-school, where instruction is given by a teacher qualified according to law to teach orthography, reading, writing, English grammar, geography, arithmetic, and good behaviour, at least one term of eleven weeks of the twelve months next preceding the time of such employment, and for the same period during any and every twelve months in which such child shall be so employed."—St. 1836, ch. 245, §1; 1849, ch. 220, §1.

"The above prohibition does not apply to any child who shall have removed into this commonwealth from any other State or country, until such child shall have resided six months within this commonwealth." —1849, ch. 220, §1.

"The owner, agent, or superintendent of any manufacturing establishment, who shall employ any child in such destablishment contrary to the above provision, shall forfeit a sum not exceeding fifty dollars for each offence, to be recovered by indictment, to the use of common schools in the town where such establishment may be situated."—St. 1836, ch. 245, §2; St. 1842, ch. 60, §2; 1849, ch. 220, §3.

"It is the special duty of the school committees in the several towns and cities of the commonwealth to prosecute the owners, agents, or superintendents of manufacturing establishments, for employing children under fifteen years of age, who have not received the instruction above described."—St. 1842, ch. 60, §1.

Commercial advantages of the United States.

Commercially, advantages of no ordinary kind are presented to the manufacturing States of the American Union. The immense development of its resources in the West, the demands of a population increasing daily by emigration from Europe, as also by the results of a healthy natural process of inter-emigration, which tends to spread over an enlarged surface the population of the Atlantic States; the facilities of communication by lakes, rivers, and railways; and the cultivation of European tastes, and consequently of European wants; all tend to the encouragement of those arts and manufactures which it is the interest of the citizens of the older States to cultivate, and in which they have so far succeeded that their markets may be said to be secured to them as much as manufacturers, as they have hitherto been, and will doubtless continue to be, as merchants. For whether the supply is derived from the home or foreign manufacturer, the demand cannot fail to be greater than the industry of both can supply. This once fairly recognised, those jealousies which have ever tended to retard the progress of nations in the peaceful arts, will be no longer suffered to interfere by taking the form of restrictions on commerce and the free intercourse of peoples.

The extent to which the people of the United States have as yet succeeded in manufactures may be attributed to indomitable energy and an educated intelligence, as also to the ready welcome accorded to the skilled workmen of Europe, rather than to any peculiar native advantages; since these latter have only developed themselves as manufacturing skill and industry have progressed. Only one obstacle of any importance stands in the way of constant advance towards greater perfection, and that is the conviction that perfection is already attained. This opinion, which prevails to a larger extent than it would be worth noting here, is unworthy of that intelligence which has overcome so many difficulties, and which can only be prevented from achieving all it aspires to, by a vain-glorious conviction that it has nothing more to do.

In concluding this Report, I cannot do so without expressing my obligations, as an individual member of the Commission, for the courtesy, attention, and ever-ready kindness with which all my inquiries were responded to by all classes of Americans with whom my duties brought me in contact in the United States.

I have, &c.
(Signed) GEORGE WALLIS.

Society of Arts and Government School of Art,
Birmingham, December 31*st,* 1853.

APPENDIX No. I.

TABLE of PRODUCE, &c., of the COTTON MILLS at Lowell, Massachusetts, January, 1853.

Manufacturing Company.	Number of Mills.	Spindles.	Looms.	Females employed.	Males employed.	Yards made per week.	Cotton consumed per week in lbs.	Kind of goods made
Appleton Company	3	17,920	700	400	120	150,000	60,000	No. 14, shirtings and sheetings.
Boott Cotton Mills	5	51,866	1,432	870	262 including male tenders.	300,000	90,000	Drillings No. 14. Sheetings, shirtings, jeans, and printing cloth, No. 30.
Hamilton Manufacturing Company	4 and Print Works	47,168	1,340	750	406	250,000	80,000	Prints, flannels, ticks, and sheetings, No. 14 to 30.
Lawrence Manufacturing Company	5	44,800	1,382	1,200	200	260,000	95,000	Printing cloths, sheetings and shirtings, No. 14 to 30.
Massachusetts Cotton Mills ...	6	45,720	1,571	1,250	300	475,000	150,000	Sheetings No. 13. Sheeting and drillings No. 14.
Merrimack Manufacturing Company	6 and Print Works	71,072	2,114	1,650	650	377,000	84,000	Prints and sheetings, No. 21 to 40.
Suffolk Manufacturing Company ...	3	17,528	590	400	100	120,000	50,000	Drillings, No. 14.
Tremont Mills	2	16,608	620	400	100	155,000	46,000	Sheetings and shirtings, No. 14.
Total, exclusively cotton ...	34	312,682	9,749	6,920	2,138	2,087,000	655,000	
Lowell Manufacturing Company ...	1	8,050 (Cotton only.)	205 (Cotton only.)	800 (In cotton, wool, and carpets.)	500 (In cotton, wool, and carpets.)	50,000 (Cotton only.)	90,000 (Osnaburgs.)	Osnaburgs.
	35	320,732	9,954	7,720	2,638	2,137,000	745,000	

APPENDIX No. II.

Class XI.—Cotton.

Mr. Le Weeks to Mr. Wallis.

Hannahatchei, Stewart County, Georgia,
July 25, 1853.

Sir,

A communication has been received at this Bureau from an intelligent planter in Georgia, accompanied by several bolls of cotton, asking information upon the following points relating to the harvesting, ginning, packing, and manufacture of cotton; viz.:—

"1st.—Does the well-matured cotton boll yield its staple, or fibre of different lengths, in one or the same boll or lock; or does the fibre of an individual seed exhibit an approximate uniformity in its length before separation by the gin?

"2nd.—What per-centage of loss would be considered a fair average in your establishment for a twelvemonth stock on the gross weight of cotton consumed, by reason of dust, grit, or sand?

"3rd.—What is the per-centage of loss, as above, caused by vegetable substances, as leaves, grass, trash, motes, &c.?

"4th.—What is the per-centage of loss arising from shortened or divided fibre, caused by ginning, and which flies off during the process of manufacturing? Also, how much, in your judgment, is the strength and durability of your fabrics diminished in consequence of such breakage or division?

"5th.—Has the general condition of staple (as to length and strength) deteriorated for the last twenty years?"

The object of the communication above referred to appears to have been intended to disabuse and correct a sentiment prevailing in some of the cotton-growing States among the planters, that it is really non-essential, in *point of value*, to the manufacturer, whether the staple is broken by ginning, or whether it is foul from grass or other extraneous matter, except so much as it may happen to be increased thereby in weight. The question has also arisen whether there may not be an improvement made in the cotton gin, should it prove that the fibres attached to each seed are of approximate or uniform lengths.

Any information which you may be able to impart relative to the points herein considered will be acceptable to this Bureau, and will be duly appreciated by the cotton-planters in the South.

You will understand these inquiries to apply only to short staple or upland cotton.

I have, &c.
(Signed.) HENRY LE WEEKS.

Mr. Le Weeks to Mr. Wallis.

Hannahatchei, Stewart County, Georgia,
July 28, 1853.

Sir,

I would respectfully submit the following question to your consideration, in relation to "Sea Island" or "Long Cotton," desiring your attention and answer thereto at an early date after the receipt thereof.

"Does this species of cotton present a large comparative difference in the length, strength, and firmness of its staple or fibre? And, if so,

"Does this difference make it practically necessary that a process of assorting should be made a pre-requisite to its more successful manufacture?"

The object in view is to forward the cotton in such condition as will best meet the wants and convenience of the manufacturers. It is highly probable that the necessary assorting could be accomplished during the process of gathering and ginning while in the planter's hands, with more facility than after it has been packed in bales.

Your answers are anticipated with much interest by

Yours, &c.
(Signed) HENRY LE WEEKS.

Mr. Wallis to Mr. Le Weeks.

Society of Arts and Government School of Art,
Sir, *Birmingham, October,* 11, 1853.

I have now the honour to acknowledge the receipt of your communications of the 25th and 28th July, transmitted through his Excellency John F. Crampton, British Minister at Washington, to whose care I address this reply.

The queries contained in both your communications appeared to me of so much importance, that I considered it would be more satisfactory to you to have the opinion of one or more gentlemen whose practical knowledge of the cotton trade would be a guarantee for the accuracy of their answers. I, therefore, communicated with Thomas Bazley, Esquire, President of the Manchester Chamber of Commerce, and Henry Houldsworth, Esquire, also of Manchester, two of our most eminent cotton-spinners, both of whom are producers of the finest yarns spun in Europe; and at the suggestion of the first-named gentleman, I also sent copies of your queries to Robert Hyde Greg, Esq., of Norcliffe, near Manchester, an extensive consumer of short staple cottons. I have now the satisfaction to quote their replies to my communications, so far as they affect the questions you have put to me. Mr. Bazley says:—

"*Manchester, September* 22, 1853.

"In the same pod of Sea Island cotton, short as well as long fibres are found and associated. Evenness of length of fibre is most desirable, and the consumers will always pay a higher price for long and equal stapled cotton; than for short and irregular cotton.

"If possible, cotton ought to be grown with its fibres of uniform length; but when they are irregular, any process which does not injure the cotton and sorts them, would be an advantage which would be appreciated.

"*Bowed* Georgia cotton, like any other, is found to consist of fibres of various lengths, but the most valuable is the most regular.

(Signed) "THOS. BAZLEY."

Mr. Greg replies *seriatim* to your queries:—

“ *September* 26, 1853.

“Query 1st.—I believe, though I seldom have opportunities of examining, that the *matured boll*, of all sorts, contains fibre of unequal length, that is, some of each is *short*, but not a large per-centage of the boll.

“2nd.—The loss of spinning on a twelvemonth’s account will be perhaps oz.—

1	in the lb.	of	fine.
1¼	”	”	fair.
1½	”	”	good middling.
1¾	”	”	middling.
2	”	”	ordinary.
2 to 4	”	”	inferior.

The latter loss depends chiefly on dust and sand, nothing else weighing heavy. From all these some fibres and some oily waste again find their way into coarser fabrics, selling from the mill at ½*d.* per pound possibly. What I have given is the difference between the cotton weighed in, and yarn weighed out, and often includes some *damp.*

“3rd.—Motes and vegetable matter amount to little in the better qualities, and perhaps one-half in middlings.

“4th.—When staple is short, we put in 5, 10 or 20 turns per cent. more in spinning, and of course, in that operation produce that per-centage less yarn.

“5th.—*Deterioration.*—About twenty years since, the *boweds* or Eastern cotton began to grow worse, shorter staple and much injured or broken, and ‘napped’ in ginning, and for ten years we never bought a *bag*—that being the form it then came in—but confined ourselves wholly to Gulf cotton, Orleans, or Mobiles, which (some might be as short as the boweds or Uplands) gave plenty of choice, and, I know not why, was seldom injured by the gin. About five years since there seemed to be a change in the Eastern cotton, the staple improved,—little injury from the gin; and the *bag* was wholly abandoned, and I now buy Orleans and boweds (Uplands) indifferently. During many years the *name* of boweds excluded half the buyers, and $\frac{1}{2}d.$ per pound less price was established solely from the name. This is now wearing away. I have heard that planters, finding the disrepute of their article, imported Orleans seed, and took other steps to improve. The cotton come this year is shamefully dirty. *Straws and broken stalks and grass* are quite unmanageable, independently of the objection of loss of weight; and *we* have cotton lying in Liverpool, and there are tens of thousands of bales no spinner will buy at any price. Leaves fall out in spinning, motes are struck out, sand and mud form only 1, 2, 3 or 4 ounces of waste, and may be estimated; but straws and grass bits clog the machinery, stop the frames, spoil work, and the operatives leave the mill and will not work the cotton at all. This defect reduces the value to a consumer 25 per cent., but this cotton is bought and sold by speculators, and now a great accumulation exists in Liverpool which will ultimately pass into consumption at a low figure. During many years past we have noted but very little mischief from the *gin*, though it may doubtless break the staple a little. In the Upland cotton *formerly* the damage was extreme, reducing the value 2*d.* per pound at 10*d.*

(Signed) "ROBERT HYDE GREG."

Mr. Houldsworth, having mislaid the copy of your questions transmitted to him, says,—"My reply, referring as it does to all the points of importance that occur to me, will probably contain, in addition, much that was not specially asked for." The reply is as follows:—

"*October* 8, 1853.

"In the spinner's estimate of long staple cotton, it may generally be considered that *strength* is the first requisite. A fair and uniform length of staple next (say from $1\frac{1}{8}$ to $1\frac{3}{8}$ inch for medium purposes, and 2 inches long for the very finest), then *fineness*, and, lastly, *getting up*, *cleanness*, and *colour*.

"The spinners of the lower qualities attach most importance to *strength* of fibre and *cleanliness*, and the spinners of the finest qualities much importance to the *getting up*.

"Within certain limits a very considerable and prejudicial difference in the length, strength, and fineness of the staple of the same sample of Sea Island cotton prevails. This difference appears as if it arose in part from different degrees of maturity or development of the fibres. It exists in the greatest degree in the finer qualities of Egyptian cotton.

"It not unfrequently happens that cotton containing much fibre, worth 3*s.* per pound, is deteriorated 6*d.* to 9*d.* per pound by the mixture of short, coarse fibres in the same locks.

"The writer has some reason to think, from an examination of the few pods he has seen, that great difference of quality of fibre exists in the same pod, and in the fibres attached to the same seed,—a difference that might possibly be lessened by giving the latest developed fibres a longer time to ripen, without any sensible damage to the earlier fibres.

"The difference in the quality of the fibres in the same lock of cotton is very different in different brands and in particular seasons.

"It is probable the inequality of fibre in respect to the three important particulars of *strength*, *length*, and *fineness*, arises from more causes than one, and is influenced by the selection of the seed, the cultivation and character of the soil, the point of maturity of the pods when gathered, and the seasons. Of these the last only is beyond the control of man.

"With regard to seed, the success of Mr. Kinsey Burden, of South Carolina, in improving the length of staple of the finest class of Sea Island cotton, about the year 1825, by a selection of seeds, affords a presumption that the *strength* of fibre may be improved by similar means.

"In respect to soil and cultivation, it is presumed these must influence the fibre in some degree.

"Care in plucking the pods at some given and uniform point of their development, when the largest number of the inclosed fibres are fully developed, and but few injured by over ripeness, appears a likely means of improving the uniformity of staple; the more particularly as the striking want of regularity of Egyptian fibre, in all the three important particulars of strength, length, and fineness, is supposed to arise from the *wholesale* mode of gathering the crop practised there, viz., by whole fields at a time, instead of by single pods as they ripen.

"The fibre should not be exposed to the air after being plucked, or as little as practicable, and it should undergo the least possible shaking or handling before and in the process of packing.

"The fibres of extra fine cotton are inclined to twist together and mat and form nips when handled, and are so matted together by some planters in their processes of cleaning and packing as to be deteriorated 1*s*. per pound.

"The cotton cannot be sent home too open, as far as respects the subsequent processes it has to undergo in being spun,—the best state being that in which it is when separated from the seed by *hand*, and in that state put into the bag.

"The best mode of learning the opinions of spinners on experimental samples of Sea Island cotton, appears to be that adopted by Mr. K. Burden, 30 years ago viz., for the planter to inclose in one or more of the ordinary bags of his crop, packed at different periods during the season, small packets containing 4 to 10 lbs. weight of the cotton, the quantity of which (as estimated by the spinner) he wishes to learn, and to inclose in such pockets letters addressed 'To the spinner into whose hands this pocket falls,' *defining the points on which the grower seeks information, and asking for a communication on the subject by post, giving at the same time the grower's address.*

"The writer of the foregoing views was thus led to open a correspondence with Mr. Kinsey Burden, which was continued for some years, and led to communication with the agricultural societies of South Carolina, and otherwise to the introduction of select seed-cotton now forming an important branch of the Sea Island trade.

(Signed) "H. HOULDSWORTH."

I can add nothing to these answers which would in the least enhance their practical value, coming as they do from gentlemen whose large experience and eminent practical knowledge cannot fail to render their views useful to the cotton-planters of the United States, and it has afforded me great pleasure to have had the opportunity of procuring their opinions upon the points raised.

I have, in conclusion, to apologise for the delay in making this communication; but, owing to the absence of Mr. Houldsworth from home, and other circumstances, he was unable to reply before the 8th of October, and his communication did not reach me until yesterday.

I have, &c.

(Signed) GEORGE WALLIS.

Memorandum of the substance of a communication from Mr. Le Weeks to Mr. Wallis, dated November 28, 1853.

On raising "Upland" Cotton Seed.

For the last ten years there has been an annual importation of seed into south-western Georgia. The seed, however, is not unfrequently grown in that cotton-growing region, and is often produced by the planter himself; as occasionally in passing through a plantation when in full season of fruit-making, a stalk will be found remarkable for the sound healthy appearance of every part, for the thick-set fruit or bolls, for the number and closeness of its limbs, and also the large size of the bolls well filled with a good bodied fibre. This attracts the planter's attention, and he has these bolls carefully saved from time to time as they mature. In due season he plants the seed thus obtained entirely away from his other crop, and soon obtains seed enough for his own use, and that of others also.

Probably thirty varieties of short staple or "upland" cotton can be enumerated in the county of Stewart (Georgia) alone, each at the outset of its career being celebrated for some peculiarity that ostensibly commended it to the notice of the planter. In this way varieties have been mixed and mingled until it is certain that there is scarcely a crop grown in the

Chatachoochee river and its vicinity of a pure species. Twenty years ago it was chiefly understood that all cotton was grown from varieties known as "petit Gulf," "royal Gulf," and "green seed."

It may be concluded, inferentially, that to this cause, viz., the mixing of varieties, may be attributed many of the perplexities of the spinner from irregular fibre. As to length, two kinds have had to be abandoned, the "*silk*" and "*mastodon,*" which always promised finely as field prospects, but from the length of fibre were wholly impracticable in ginning. The fibre is too long for the kind of gins used in south-western Georgia.

Some planters contend, in order to justify the mixing of varieties, and that too with some plausibility, that the tendency of cotton in the climate of the Southern States of America is to deteriorate, and that in order to recover the loss, it is necessary to plant mixed varieties as a remedy.

Mr. Le Weeks' own opinion on this point, although he confesses to having many respectable authorities against him, is that "*every crop planted should be a pure variety,*" and to preserve against the falling off in successful production, there should be a change of the seed, say from river lands to high uplands, from gray sandy soils to red clayey or stiff soils, and *vice versâ.*

On the preparation of Land and the cultivation of "Upland Cotton."

The ordinary preparation of land is, first, running a furrow with a small plough, and repeating the same at such a distance apart as the land will allow, according to productiveness. This distance varies from 2½ feet to 5 or 6 feet, the controlling object being to have the space nearly "locked" by the extension of the limbs or side branches when the plant is maturing, care being taken not to be too close, as the "bottom," or first matured bolls need air and sunshine to open them. At that period they are under the growing foliage of the plant above them, and if they are too much in the shade they rot in the unopened state.

The land is then made into "ridges" by turning on each side of this furrow one-half of the earth each way to the first or guide furrow. At planting, a small plough is run on the top or centre of this ridge, a field-labourer follows and strews the seed with a cast of his hand, say ten to twenty seed per foot. Another labourer follows with a horse drawing a plough-stock with a straight-edge plank or iron fixed, instead of the plough, and covers up the seed by striking the loose earth into the furrow and filling it up.

After the seed is up, the plough is run round the cotton, turning up the earth from the young stems. The hoes (about 10 inches wide) follow and chop through the drills the width of the hoe, leaving a few young plants, say at every 10 inches. Another plough follows the hoes and throws the earth back again upon the cotton to preserve the ridge.

The next time the cotton is gone over, it is put to a "stand," *i.e.*, all superfluous plants are taken out, leaving one only standing at the proper interval to be cultivated.

This is a time of much interest and anxiety to the cotton-planter, for after he has brought his crop to a "stand" every stalk or plant lost is a loss to his crop. The disasters at this stage, as also previously, are :—

1st. "*Rust,*" "*sore shin*" or the sickly dwindling and death of the young plant, it being as tender as a cucumber, bean, or other vegetables which bring up their seed on their first development.

2nd. "Lice," an insect in all respects similar to those which infest cabbage, &c. These prey upon the sap of the leaves and exhaust it, producing death to the plant.

3rd. "*Cut worms*" or "*wire worms,*" so generally known to gardeners, burrowing by day, and appearing at night in search of food, cutting the stem or main stalk off. These often continue to infest the plant until it is 10 to 20 inches high, and then ascend near to the extremities and lop off the buds or ends of the branches.

After the crop begins to make its first "set" or crop of bolls, say in August, the "boll worm" is then the common enemy, its immediate progenitor being a *moth* or *miller,* somewhat smaller than the silkworm species. This insect too is nocturnal, lays one or more eggs in the extremity of the limbs. The young worm on appearing feeds first on the little tender bolls just "set," then advancing towards the centre, takes the next, as it is a few days older and the worm stronger, and so on until the fully matured boll is attacked, and here this insidious insect finds its farewell banquet. Thus this worm will in two months destroy one-half of the planter's prospective crop. It is, however, the last of the disasters to which the cotton-plant is subject. Showers of rain too are very dangerous when the blossom is open, as one drop of water falling within the blossom the first day it opens, ruins it.

Blossoms open white in colour the first day, and red the second, which is also the last. They open from 10 A.M. to 3 P.M., and on the third day fall off.

On gathering and housing "Upland" Cotton.

The time of commencing to gather cotton varies from 10 to 30 days in different years. This variation is brought about essentially by the difference in the seasons, owing to cold backward springs which always prevent the plant from growing off. Long droughts also suspend its growth when planted, as also wet weather after the first bolls are grown.

Generally some portion of the cotton is "picked" out during the last half of August. An acre of land which will produce 1000 lbs. weight of cotton *unginned* will yield from 50 to 150 lbs. the first picking. If the weather be pure, dry and sunny, it will in three or four weeks be 300 to 500 lbs. for the next "picking." The balance will be opened soon after the next killing frost, say in November. Thus may be understood the planter's technicalities of "bottom," "middle," and "top" cotton. "Bottom" and "top" cotton are inferior to the middle; as the "bottom" is near the ground, it does not "flush out" when opened, and is likely to be dirty from earth. The "top" is grown when night dews, &c., are cooler, and is more tardy in maturing. Besides, the vigour of the plant is somewhat exhausted, hence its inferiority is a want of perfect development. The "middle" cotton is that which constitutes the most desirable sample, provided rains and winds do not injure its appearance.

The process of picking is as follows: Each field-hand or labourer has a canvas sack suspended around his neck, and hanging down nearly to his knee, into which he may put from 10 to 20 lbs. Having a large basket standing halfway, when his sack is full he places its contents therein, and again proceeds with his "picking." At noon and in the evening a waggon and team is sent round to convey the baskets when filled to the gin-house. This proceeds until the whole crop is "saved" or housed.

A fruitful source of the admixture of irregular fibre of unequal length, strength, and fineness, may occur here in continuing to gather the "*bottom*," "*middle*," and "*top*" cotton, and housing these various grades indiscriminately in the same bulk.

A bulk sometimes equal to the whole capacity of the gin-house, as to room and power to support weight, will be got together; and as the gin stands on one side, and its feeding is done from the bulk without selection, a portion of the *first* and the *last* "picking" may be packed together in the same bale.

G. W.

APPENDIX No. III.

Class XII.

Description of the Bay State Mills, Lawrence, Massachusetts.

(With Illustrative Plans.)

Extract from the Report of the Sanitary Commission of the State of Massachusetts, 1850.

The manufacturing establishments at Lawrence have been erected under favourable circumstances. They were planned and constructed under the scientific skill and practical experience which had been acquired by wise and successful men, in a series of years, in other places, aided by excellent water-power, ample capital, and under reasonable national and state legislation. The results have appeared to us so admirable, and so highly worthy of imitation, that we have supposed we could not perform a more useful public service than to give a more particular description of one of them. It will show, in a favourable light, the intelligence, the enterprise, and the liberality that has generally presided over all the affairs of this town.

The establishment belonging to the "Bay State Mills" is devoted to the manufacture of cassimeres, shawls, and other fancy woollen goods, and was planned and erected under the general superintendence of Samuel Lawrence, Esq. It is the largest mill of the kind in the world, and will consume, when in full operation, more than 2,000,000 lbs. of wool annually. The mills occupy a parallelogram of 1,000 feet in length by 400 feet in breadth, between the canal and the Merrimack river. Buildings are erected on the outer borders of this site, affording a spacious central area. That on the river side is 1,000 feet in length and 40 feet in breadth, with two wings, at right angles, at the ends, 240 feet by 40 feet, and outer porches for ingress and egress. The whole is three stories in height, excepting the centre, 52 feet by 42 feet, which is five stories high. On the side next the canal is another line of buildings, 800 feet in length, 38 feet in width, and two stories in height, designed for counting-rooms, store-houses, watch-houses, and other purposes. Within the interior the three principal mills are erected, each 200 feet by 48 feet 8 inches, containing, including the basement and the attic, 9 working floors. All these mills are substantially built of brick, and covered with slate. The rooms are 11 to 13 feet in height, and are warmed with steam, and lighted with gas. The apparatus for warming consists of wrought-iron pipes, 1, 3, or 4 inches in diameter, placed in three, four, or five parallel lines around the interior of the building, immediately under the windows in each story, maintaining in all the rooms, at all times, a uniform temperature of about 68°. A structure to supply the steam is situated in each wing of the river building, and has 12 boilers, and a chimney 135 feet in height. All the rooms are provided with hydrants, to which force-pumps and hose are attached, that may be used in case of fire, for washing, and other purposes. A person is employed in each room to keep every part of it and the stairways clean. Each mill is also provided with extra porches, one in front and the other in the rear, and with four iron ladders reaching from the bottom to the top, for ascent or descent in case of fire, or for any other purpose. The motive power for these mills is obtained from seven breast-wheels of the first class, 23 feet 4 inches in length, 26 feet in diameter, and of 125 horse-power each, two of which are placed in each principal mill, and one in the river mill. Eight mill-powers were purchased by this company.

The boarding-houses are on the opposite side of the canal, and consist of four blocks, substantially built of brick, and covered with slate, each 250 feet in length, 36 feet in breadth, 3 stories high, of 10, 9, and 8 feet respectively, with 4 L's in the rear, 1 story high, to each block. Each block contains 8 tenements, and each tenement, except the end one, 33⅓ feet in width and 36 feet in depth, exclusive of the L, and contains 20 rooms, including the attic, and is designed to accommodate 36 boarders. The location and size of the rooms will appear from the accompanying plan and illustration. The end houses are 25 feet in width, a little smaller than the others. The houses in each block, except the end ones, are like that on the right of the plan here presented. As you enter this tenement on the left there is a small room appropriated exclusively to the mistress of the house. At the right are two dining-rooms, connected by folding doors, each forming pleasant sitting-rooms at other than meal times. Passing through the entry you enter the kitchen, which is furnished with all necessary conveninces. Beyond this is the back kitchen, containing a large boiler and conveniences for other household purposes. In the rear of this is the wash-room, from which you pass into a large yard, inclosed by a high tight fence, having at the end the wood shed, 14 feet wide, and the privies, the whole bordering on a common passage-way 14 feet wide. Under each alternate fence is a double cesspool, serving for two houses, and having an underground passage leading to the common sewer under the sheds. A well of pure water is connected with every four tenements, and all are supplied with soft water, for washing and other purposes, by cast-iron pipes leading from cisterns in the mills to the sinks in the several houses. On the second floor is the parlour and also the sick-room; a small chamber with a fireplace, designed for an invalid who may need seclusion and extra warmth. Besides these, are sleeping apartments for the boarders in the second and third stories and in the attic, designed to accommodate two, four, or six persons each, according to the size of the room. Each tenement cost about $4,000, exclusive of the land, and will compare to advantage with respectable dwelling-houses in Boston, and are much better than the average in country villages.

To protect the health of the inmates, underground sewers are constructed under the sheds in the rear of each block, through which a current of water, supplied by iron pipes connected with the canal on the left or above the block, is constantly running, carrying off all the contents of the privies, cesspools, and other filth, and passing at right angles under the canal, discharging them into the river, preserving the houses perfectly free from offensive smells. A plan of these sewers may be seen in the accompanying illustration. *Thirty thousand dollars* was expended by this company in their construction alone, for the benefit of the health of the operatives!

Labour begins, or the gate closes, at five o'clock a.m. from May 1 to September 1, and at ten minutes before sunrise the remainder of the year. A first bell is rung about forty minutes before, to allow time to prepare for work. *Labour ends* at half-past seven p.m. from September 20 to March 20; at seven from May 1 to September 1; and at fifteen minutes after sunset for the remainder of the year. Dinner during the whole year is at half-past twelve p.m. Forty-five minutes are allowed for each meal.

The number of operatives at present employed in these mills is 1,867, of whom 956 are males, and 911 are females. When entirely completed and in full operation, they will employ about 2,500, and require a town population of 7,500. The principal part of the operatives work by the job, the males earning on the average about $5 80 cents per week, and the females about

$2 75 cents per week, besides board, which is $1 50 cents to $2 per week for males, and $1 25 cents for females. The females are principally inmates of the boarding houses. Most of the males, however, have houses of their own, or board elsewhere.

The boarding houses for the accommodation of the operatives in these mills, as in other manufacturing establishments, are owned by the corporation. They have been erected, not for an investment of capital on which a profitable income is to be anticipated, but as a means of preserving a proper supervision over the operatives employed, and for their benefit. Boarding houses of this kind generally afford less than 4 per cent. interest on the capital invested. Some afford no income at all, and even become an annual expense to the owners. They are kept in repair and rented to the tenants, subject to such regulations and restrictions as the company see fit to establish. The rent and price of board are fixed by the company, but both are subject to such alteration as the circumstances of the times, and of all the parties interested, shall render just and proper.

The tenants of the Bay State boarding houses now pay $150 each annually, which is about *three per cent.* on the cost. The furniture of the houses is obtained and owned by the tenants themselves, and they furnish provisions and other articles of consumption for the inmates. They now receive $1 25 cents per week for the board of females, and $1 75 cents to $2 for males. The fare provided is of a plain, substantial, and wholesome kind, well prepared, neatly served, and in sufficient quantities. Operatives are under no compulsion to board in one tenement rather than in another ; it is for the interest of the boarding-house keepers, therefore, that the bill of fare should be attractive and satisfactory. The keepers are sometimes men with wives and families, but they are generally widows, or females who have been accustomed to perform the principal part of the business of providing for their families, and who desire a remunerating means of subsistence. Applications for these situations are generally numerous, but they can be obtained by none but persons of known capacity and respectability; and whenever indications of a different character are manifested, the obnoxious keeper is immediately ejected. Males and females are not allowed to occupy the same house, not even a man with his wife, as boarders.

Several classes of regulations to be observed by the inmates of these houses are printed and placed conspicuously in each house. One code is as follows:—

"1.—The tenants must not underlet any part of their tenement, nor board any persons not employed by the company, unless by special permission; and in no case are males and females to board in the same house.

"2.—The tenants must, when required by the agent, give a correct account in writing of the number, names, character, habits, and employment of their boarders, and whether they are habitual attendants on public worship. They must also, on the first Monday of every month, send to the counting-room a list of all the boarders they have taken, and of all who have left their houses during the preceding month. They must also, at the same time, render a list of the names of all such boarders as have required the services of a physician, on account of sickness, during the same period.

"3.—The doors must be closed at 10 o'clock in the evening, and no one admitted after that time, unless some reasonable excuse can be given.

"4.—The boarders must not be permitted to have company at unseasonable hours.

"5.—All improper conduct among the boarders, and all rude and disorderly deportment, must be prevented by the tenants, if possible, and if persisted in must be reported to the agent.

"6.—It is confidently expected that all children over 12, and under 14 years of age, living in the houses, be kept constantly at school.

"7.—It is indispensable that all who live in the houses should be vaccinated, and this will be done at the expense of the company, by a physician, at the counting-room, for all those employed by the company and for the families of the tenants.

"8.—The health of the inhabitants requires that particular attention should be paid to the cleanliness and daily ventilation of the rooms.

"9.—No water, nor filth of any kind, must be thrown out in front of the houses, nor be allowed to remain in the cellars, backyards, or sheds.

"10.—Ashes must not be kept in wooden vessels, nor will any carelessness be allowed in the use of fire or lights. Neither camphine nor any other explosive compound used for lights will be allowed on the premises.

"11.—The rooms must not be mutilated nor defaced, and in all cases where the plaster of the walls is broken, either by driving in nails, screws or pins, or by rubbing with furniture, or by any carelessness, or by any other means beyond ordinary use and wear, the injury will be repaired, and the cost thereof charged to the person leasing the house.

"12.—A suitable chamber for the sick must be reserved in each house, so that they may not be annoyed by others occupying the same room.

"13.—Window glass must not be allowed to remain broken longer than one day.

"14—Wood and coal will not be permitted to be taken into the cellars, nor from them, through the front windows.

"15.—The closest supervision will be exercised to enforce these rules, and the tenants themselves are particularly required to pay close attention to them, and to insist upon their observance on the part of their boarders.

"16.—No tenement will be leased to persons of immoral or intemperate habits, and any tenant who, after occupancy, shall be found to be of such habits, or to receive boarders of such habits, will be notified to vacate the premises.

"☞ *The tenants are particularly desired to lend their aid in the preservation of the trees in front of the houses, and to give immediate information to the agent if any injury be done them.*"

Similar regulations are issued by the Atlantic Cotton Mills, besides an additional code, one section of which is the following:—

"A proper observance of the Sabbath being necessary for the maintenance of good order, all persons in the employ of this Company *are expected to be constant in attendance at public worship*, and those who habitually neglect this regulation, or who are known to attend improper places of amusement, will be discharged."

The execution of these and other police regulations of the whole estabishment is entrusted to the general agent, who, by his known capacity, his experience, and his character, is fitted for the station. Under his wise and systematic supervision, the boarding-houses and all the departments of these extensive mills are managed with the same care as a small well-regulated family.

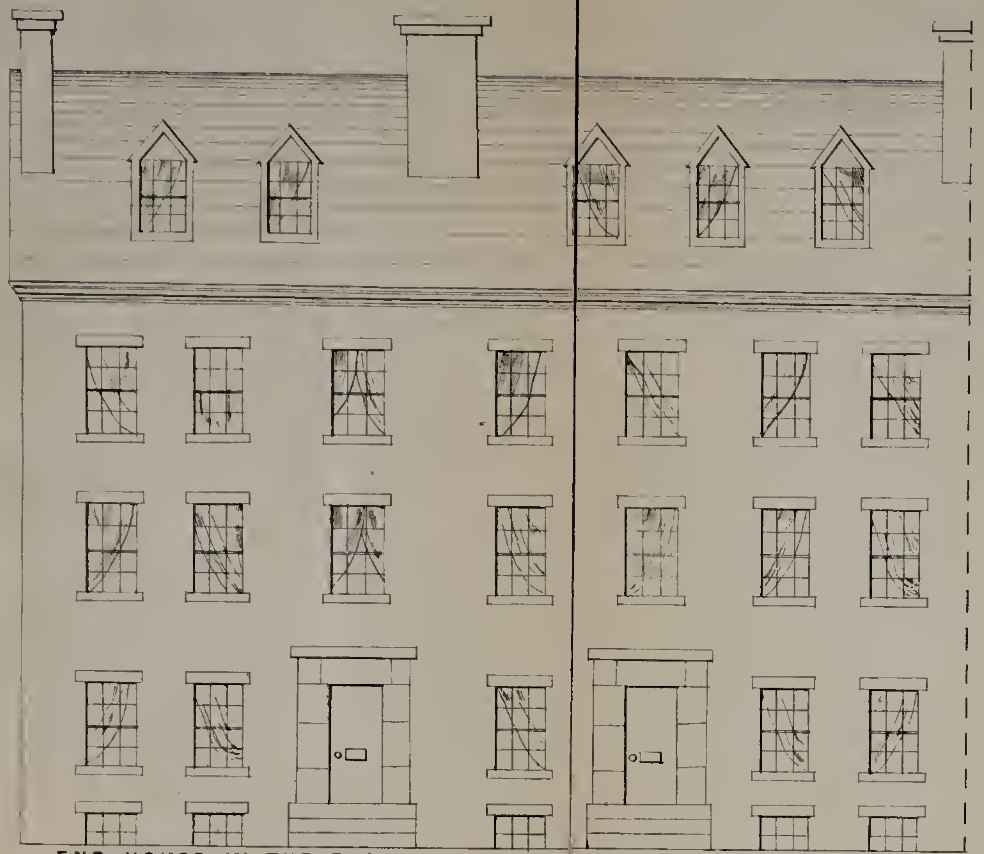
The influence of the system by which the boarding-houses are regulated is immensely beneficial, whether we consider it in a social, moral, or sanatory point of view. It is an influence which is felt by all the operatives, at all times, while they are out of the mills as well as in them. In the boarding-houses too, a care, attention, and oversight are frequently exerted by the landlady over her boarders, which is nearly allied to that which a kind parent exerts over her children, and which produces almost as strong a mutual attachment in the one case as in the other.

PLANS OF THE BOARDING HOUSES FOR OPERATIVES

BELONGING TO

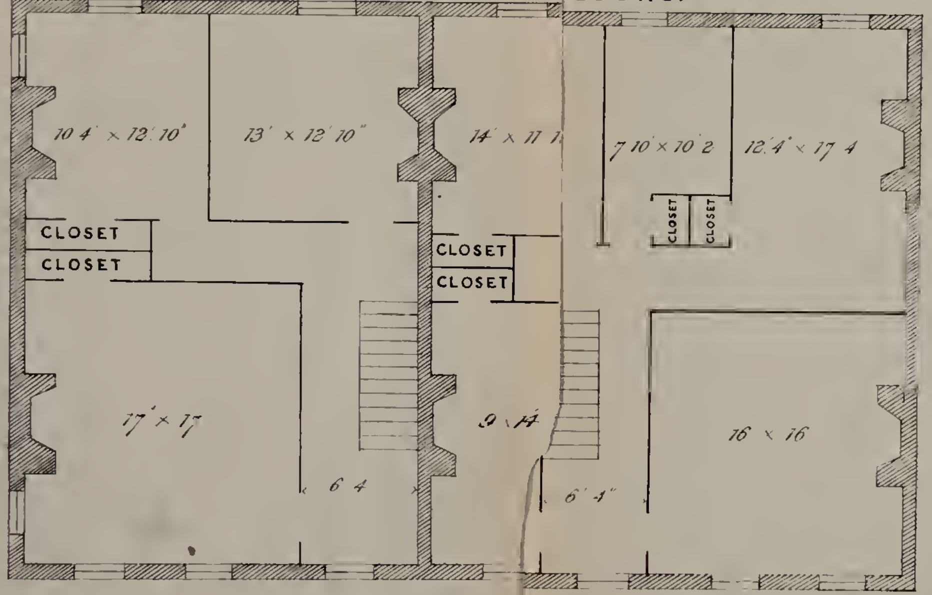
THE BAY STATE MILLS, LAWRENCE, MASSACHUSETTS.

Enlarged from the Sanatory Report of the State of Massachusetts.



END HOUSE IN THE BLOCK. SECOND HOUSE IN THE BLOCK.

SECOND & THIRD FLOORS.



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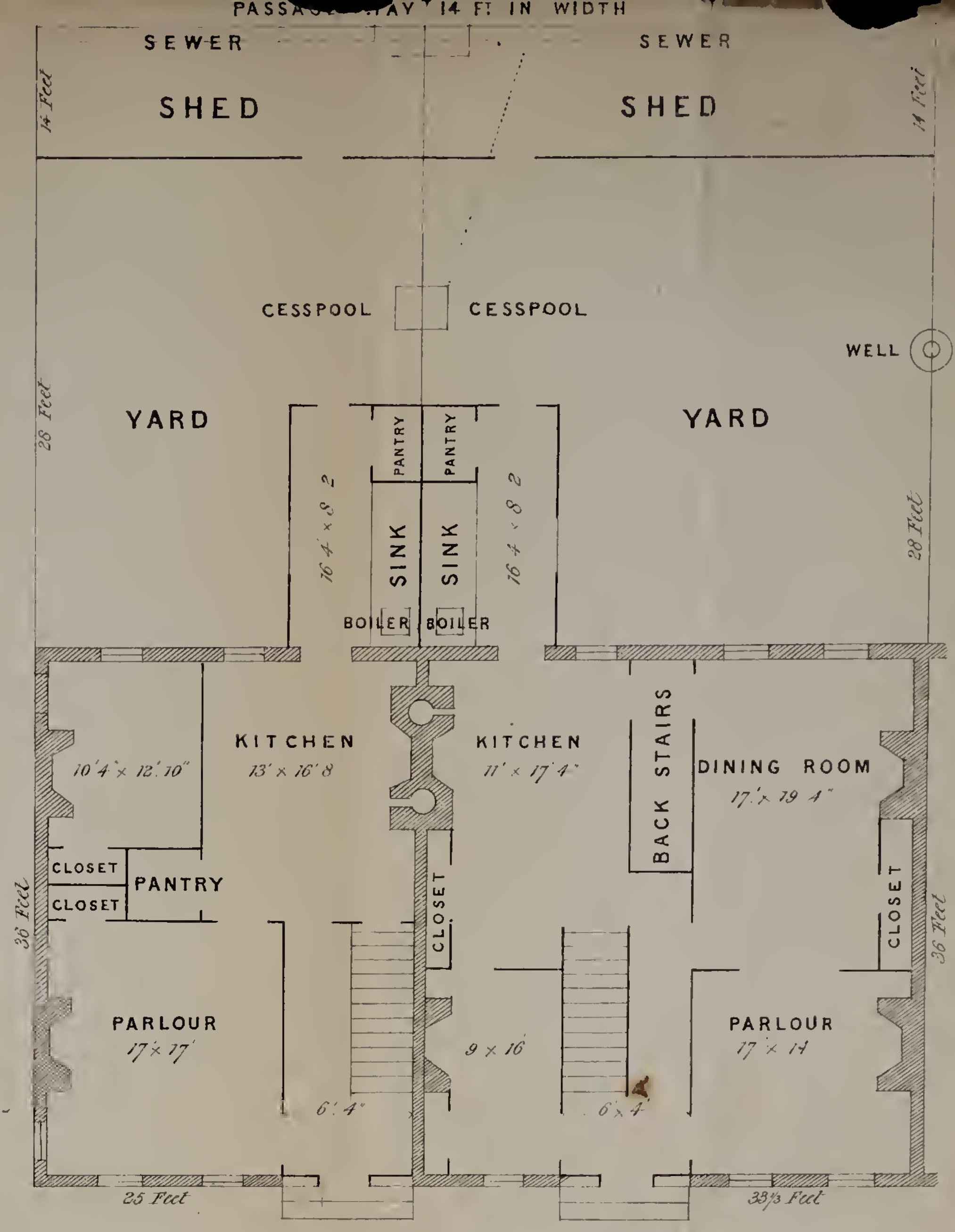

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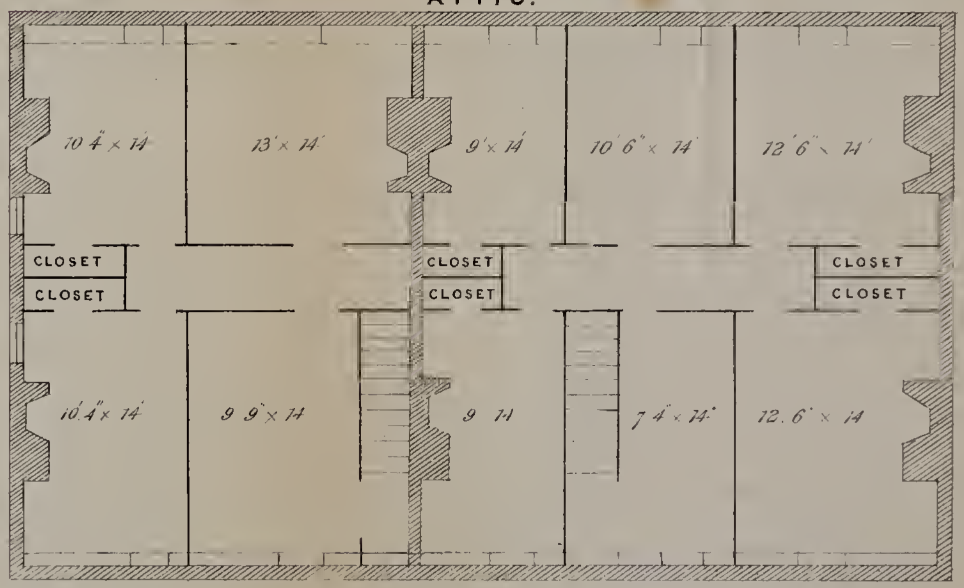

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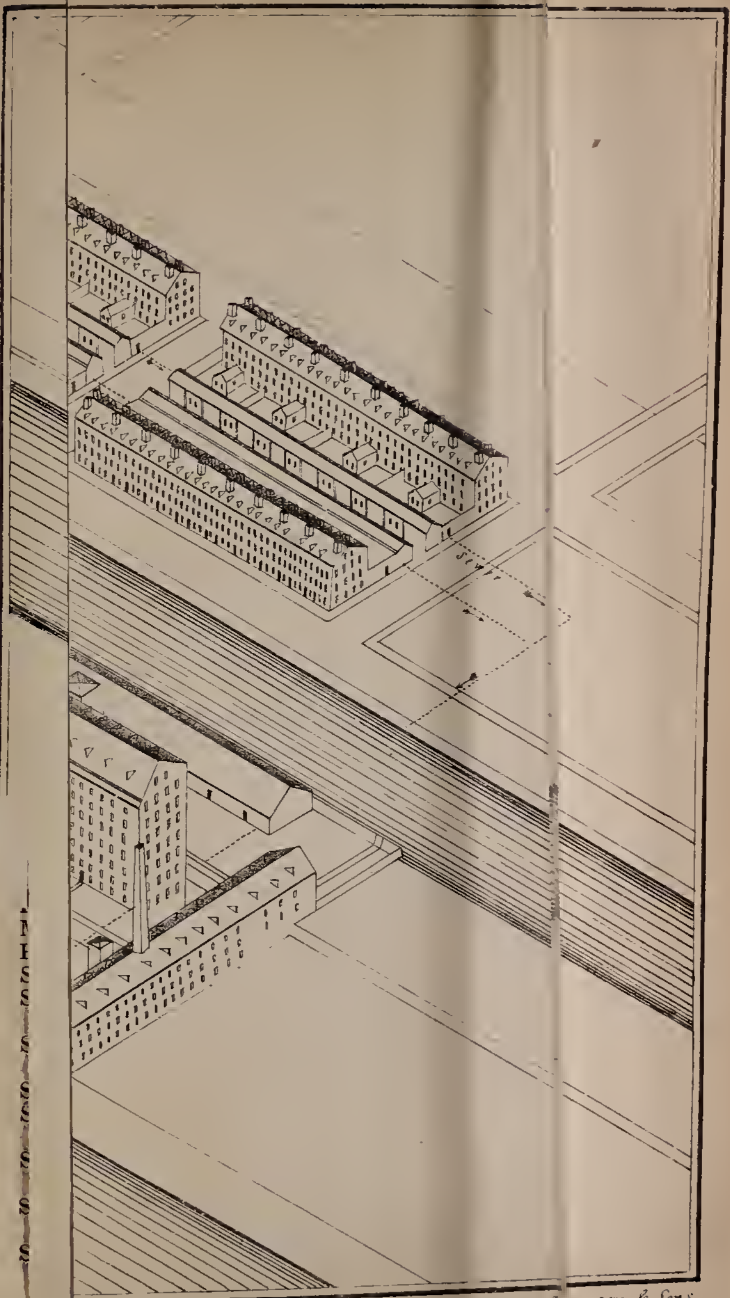

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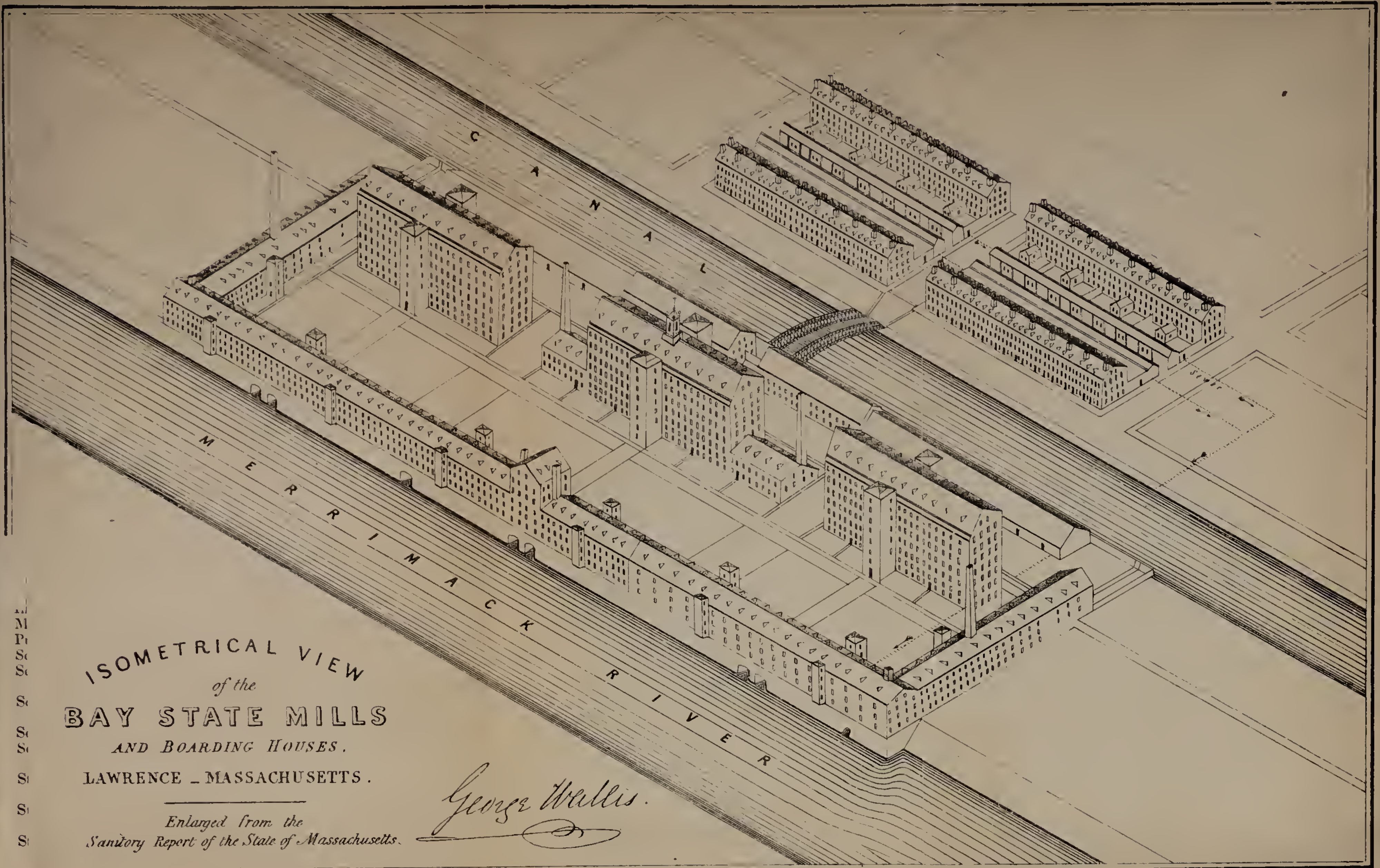

ISOMETRICAL VIEW
of the
BAY STATE MILLS
AND BOARDING HOUSES.
LAWRENCE _ MASSACHUSETTS.

Enlarged from the
Sanitory Report of the State of Massachusetts.

George Wallis.

London Harrison & Sons

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PRINTED BY HARRISON AND SONS,
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